OTHMER LIBRARY MOVES AHEAD (see page 11)

CHEMICAL HERITAGE

VOLUME 10 ■ NUMBER 2 ■ SUMMER 1993

AIC Joins Chemical Heritage Family

The American Institute of Chemists is the newest affiliate of the Chemical Heritage Foundation. It joins the founding members—the American Chemical Society and the American Institute of Chemical Engineers—and the other eight affiliates listed here on our first page. In welcoming AIC, CHF director Arnold Thackray applauded "the farsighted and sensible decision of AIC" to donate its archives to CHF. The AIC papers will be "an important resource for historians seeking to understand the professionalization of American science in the era between the two world wars."

AIC was founded in 1923 during a time of concern about chemists' autonomy, professional status, and public recognition. Much of the impetus for organizing AIC came from industrial chemists who called for "professional solidarity" in response to the greater prestige of doctors and lawyers. The American Chemical Society had instead from the turn of the century welcomed into its ranks anyone with an "interest in the promotion of chemistry." Only in 1933 did the ACS add training and work experience as criteria for membership.

AIC is dedicated to the improvement of public recognition of the profession and the establishment and maintenance of standards of proficiency through continuing education and professional certification. It certifies professionals

Continued on page 3

Norman Hackerman in 1985. Courtesy the Welch Foundation.

On File: Oral Histories

"Behind the Curve"

Norman Hackerman and the Great Depression

STUDYING CHEMISTRY—something his immigrant parents did not quite understand—was what the future president of the University of Texas and Rice University had decided on by the time he was a senior in high school in 1928. Yet Norman Hackerman himself did not quite foresee where the decision would take him.

Although neither of Dr. Hackerman's parents had much formal education, they had always stressed its importance. And, as Hackerman recalled in an oral history interview, "If you wanted to be a professional over in my part of town, you became a dentist or a doctor. Doctors were looked on [as having] almost godlike qualities in those days. I don't know if they deserved it, but that was the case!" Hackerman realized early on that "business was not an important thing to [his parents], and law wasn't that important." When he finished junior high school in 1925, his innate understanding that medicine was the "epitome" of achievement had led him to select the one city high school that would best prepare him for medical school. While many of his peers entered the work force, Hackerman decided to attend Baltimore City College, one of the three all-male city high schools, bypassing the

Continued on page 26

FOUNDING SOCIETIES: AMERICAN CHEMICAL SOCIETY ■ AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

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CHEMICAL HERITAGE FOUNDATION

THE CHEMICAL HERITAGE FOUNDATION (CHF), a nonprofit organization, was established by a joint action of the American Chemical Society and the American Institute of Chemical Engineers. Affiliated societies include Alpha Chi Sigma, The American Association for Clinical Chemistry, Inc., the American Association of Textile Chemists and Colorists, the American Institute of Chemists, Inc., the American Society for Biochemistry and Molecular Biology, the American Society for Mass Spectrometry, The Chemists' Club, The Electrochemical Society, Inc., and the Société de Chimie Industrielle.

CHF seeks to put our chemical heritage to work by discovering and disseminating information about historical resources; encouraging research, scholarship, and popular writing; publishing resource guides and historical materials; conducting oral histories; creating traveling exhibits; and taking other appropriate steps to make known the achievements of chemical scientists and the chemical process industries.

CHF operates through public outreach programs and through the Arnold and Mabel Beckman Center for the History of Chemistry and the Donald F. and Mildred Topp Othmer Library of Chemical History.

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125 Years of the CHF Logo

The choice of an angular fused ring structure like that of phenanthrene as the new logo of the Chemical Heritage Foundation is indeed inspired. The history of that structure is intimately related to the major nineteenth-century fusion of science and industry, namely the synthesis of artificial alizarin, the important colorant obtained from the root of the madder plant. Two assistants of Adolf Baeyer, Carl Graebe and Carl Liebermann, achieved this synthesis exactly 125 years ago, in 1868, following their studies on the constitution of alizarin (see *Beckman Center News*, Summer 1992, 9:2, p. B-4).

Graebe had studied benzoquinones and anthraquinones, probably as part of a program to determine the structure of the red dye, which for many years was thought to be a derivative of naphthalene. It was found impossible to make alizarin from naphthalene by laboratory synthesis, however, which led Baeyer and Graebe to consider the possibility that alizarin might be based on a completely different aromatic hydrocarbon.

Early in 1869 Baeyer suggested to Graebe and Liebermann that distillation of alizarin with zinc dust might cause degradation to a more accessible precursor material. Baeyer had used this method successfully not long before, in his work on indigo, and shared and encouraged his assistants' inquisitiveness concerning the structure of the natural red dye. Graebe and Liebermann acquired a supply of alizarin from madder and began work on Friday, 21 January 1868. The initial results must have been encouraging, for they continued working through the weekend and right on until 7:00 the following Monday evening. They then hurried to the meeting of the *Deutsche Chemische Gesellschaft*, which began at 7:30, where in a short paper Graebe announced to the unsuspecting audience that the parent of alizarin was not naphthalene, but the aromatic hydrocarbon anthracene, which contains fourteen carbon atoms. The new analysis of alizarin actually agreed with data from earlier studies, such as those of Pierre-Jean Robiquet and Edward Schunck, but these had been suppressed in favor of values that suggested a substance based on naphthalene.

Graebe's presentation was all the

more remarkable for the amount of information that it revealed from just four days of work. Not only was anthracene isolated, analyzed, and characterized, but the formula of alizarin was stated as $C_{14}H_8O_4$, and extrapolating from two years of work with quinones, Graebe described it as a dihydroxyquinone of anthracene, formula $C_{14}H_6(OH)_2O_2$. The oxidation product of anthracene was formally called anthraquinone.

Graebe was now able to postulate the structure of anthracene. It had earlier been synthesized by condensing two molecules of benzyl chloride. The diphenyl acetylene structure $C_6H_5C{\equiv}CC_6H_5$ was excluded, since this did not explain how anthracene gave phthalic acid on oxidation. The only satisfactory answer seemed to lie in representing anthracene as three fused rings joined in an angular fashion (as in the CHF logo) because this structure seemed best to fit Graebe's structural representation of quinones, in which he located the two carbonyls (C=O) on adjacent carbons. Although this angular structure is in fact that of phenanthrene, an isomer of anthracene, the wrong assignment had no adverse effect on further progress.

Spurred on by the accolades of the chemical community, Graebe and Liebermann now began a particularly fruitful period of collaboration, devoted to the structure of madder constituents, a theory of color and chemical constitution, and the all-important synthesis of alizarin from anthracene. The latter was achieved later in the year, and in the spring of 1869 an improved process, based on the sulfonation of anthraquinone, was developed by Heinrich Caro at the BASF company, which had acquired Graebe and Liebermann's method. William Perkin in London and the Hoechst concern in Germany discovered the same process independently, and within a few years artificial alizarin was being manufactured on a high tonnage scale, rapidly displacing the natural product.

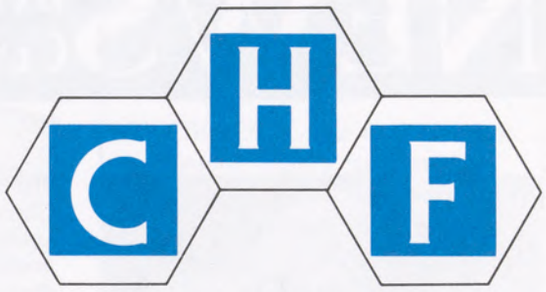
The angular structure assigned to anthracene at first remained unquestioned, and the image of alizarin became sharper with the discovery of a new hydrocarbon in the anthracene fraction. Industrial chemists were aware of the presence of additional hydrocarbons in crude anthracene, but were unsuccessful in isolating them until Carl Glaser of BASF separated one of them and submitted it to Graebe in 1872. It was found to possess the formula $C_{14}H_{10}$. This new isomer of "anthracene" underwent oxidation with chromic acid less readily than anthracene itself, yet the product was a quinone with the same molecular formula as anthraquinone. When reacted with nitric acid, the compound formed a mononitro derivative, whereas anthracene gave rise to the quinone.

Meanwhile, at the meeting of the Versammlung Deutscher Naturforscher und Ärtze held in Leipzig in 1872, Rudolf Fittig had exhibited samples of the new hydrocarbon and its derivatives, and pronounced it an isomer of anthracene. Fittig and Eugen Ostermeyer then concluded, on the basis of detailed chemical analyses, that the structure of the new hydrocarbon was identical with the angular form originally assigned by Graebe and Liebermann to anthracene. Accordingly, anthracene must be the linear form of the tricyclic system. This deduction enabled Baeyer and Caro to establish the correct structural formula for alizarin in 1874.

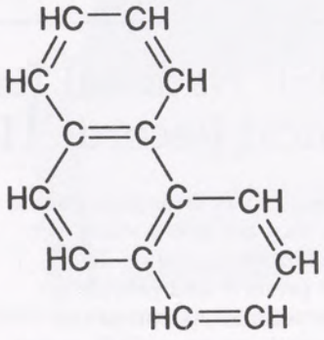
The isomer of anthracene was, of course, the angular phenanthrene, the basis of the logo of the Chemical Heritage Foundation.

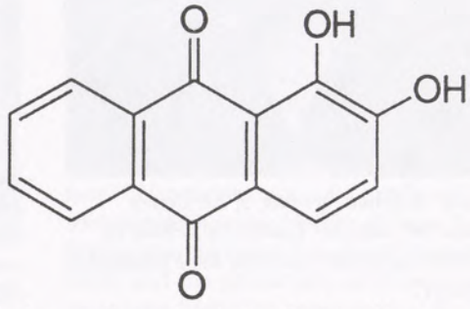
ANTHONY S. TRAVIS
Sidney M. Edelstein Center
The Hebrew University, Jerusalem

The AATCC logo, based on the linear tricyclic anthracene, part of the alizarin molecule.



The CHF logo, based on the structure of phenanthrene, a constituent of numerous steroid structures and originally thought to be part of alizarin.





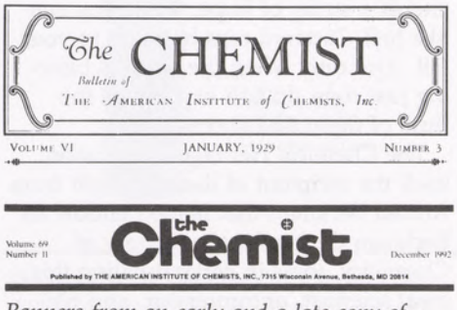
Left: *Phenanthrene, with the carbons and hydrogens shown for clarity.* Right: *Alizarin.*

AIC Joins CHF—*continued from page 1*

through the National Certification Commission for Chemistry and Chemical Engineering.

Headquartered in Bethesda, Maryland, AIC publishes *The Chemist*. In 1966 it began recognizing Chemical Pioneers, those who have been instrumental in shaping industry. A widely appreciated activity is its annual recognition of Student Award Recipients. Each educational institution in this country is invited to nominate a senior student planning to make a career in the chemical sciences.

The president of AIC for 1992–93 is E. Gerald Meyer; the president-elect is Roger P. Maickel; the secretary, Roger R. Festa; and the treasurer, William W. Gorman, Jr.



Banners from an early and a late copy of The Chemist.

NEWS from the Arnold and Mabel Beckman Center for the History of Chemistry

Arnold Beckman, winner of the Bower Award for Business Leadership. Photo by William Steinmetz, courtesy the Philadelphia Inquirer.

Arnold Beckman and the Future of R & D

Arnold O. Beckman, founder of Beckman Instruments, Inc., was awarded the Franklin Institute of Philadelphia's Bower Award for Business Leadership on 14 January 1993. An all-day symposium, "The Future of R & D," marked the event, bringing together national science policy makers, leaders of corporate research, and university researchers to discuss the impact of the sea change projected in our government's spending priorities for scientific research.

Arnold Thackray, CHF Director, introduced Arnold Beckman; Bryce Douglas, senior vice president for science when Smith-Kline joined Beckman Instruments, also spoke. Beckman described his own experiences "launching a business or new product [as] a lot like flying a kite: Your idea is held together by a flimsy framework. You put it out at the end of a string of hope, while you run like hell. Tattered rags hang on to your tail. And only when the wind is blowing just right do you experience the thrill of flight and success."

The Chemical Heritage Foundation, itself the recipient of the major gift from Arnold Beckman that helped endow its Beckman Center for the History of Chemistry, joins in congratulating this great scientist, entrepreneur, and philanthropist.

The Beckman Center is sponsored by the Chemical Heritage Foundation and the University of Pennsylvania. The Center is an academic unit of Penn, working closely with the Department of History and Sociology of Science and with the Departments of Chemistry, Chemical Engineering, and Biochemistry and the Laboratory for Research on the Structure of Matter. The Center's mission is to undertake scholarly research, publish materials on the history of the chemical sciences, support senior-level and graduate fellowships, and conduct a variety of scholarly events of interest to the academic community.

BIMOSI: National Radiobiology Archives Historical Records Help Genome Mappers

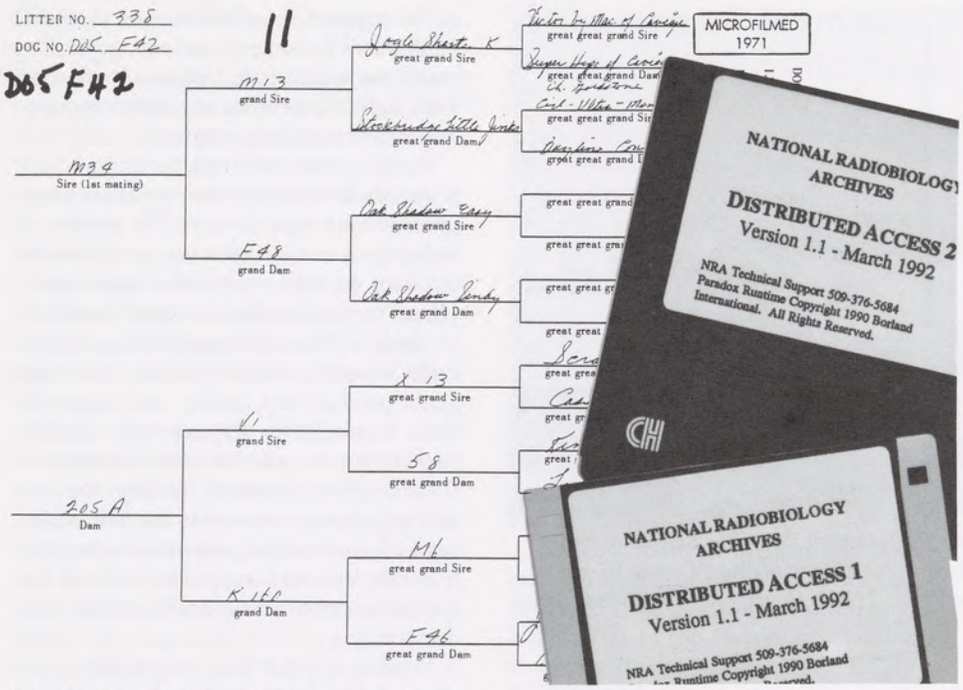
Historical records can be as important to scientists as they are to historians, yet scientific institutions are often ill-equipped to preserve and provide access to these records. As part of the BIMOSI outreach program, CHF project archivist Elizabeth Sandager recently helped an important scientific laboratory plan for the preservation of scientific materials. The records, held at the National Radiobiology Archives in Richland, Washington, contain data on more than 5,000 beagle dogs that were the subject of forty years of radiobiology research funded by the U.S. Atomic Energy Commission (AEC). The research ended in the mid 1980s, but these data are proving useful beyond the intent of the original experiments: scientists mapping the dog genome have "recycled" some of the data. The materials preserved in the collection also constitute an important historical resource for studies of the development of radiation biology, a very active historical field.

Nearly forty years ago, the AEC committed itself to conducting life-span radiation-effect studies in a relatively long-lived animal, the beagle dog, at five laboratories: University of Utah; University of California at Davis; Argonne National Laboratory; Pacific Northwest Laboratory (PNL), also in Richland; and the Inhalation Toxicology Research Institute. As the studies are completed, the National Radiobiology Archives (NRA) integrates and preserves this unique body of information.

The records preserved include not only "paper" records such as logbooks, clinical notes, dog lineage charts, photographs, and pathologists' observations, but also radiographic film and biological materials, such as microscope slides and biopsy tissues preserved in solvents or tissue samples embedded in paraffin or plastic. This year the archives also accessioned information from life-span studies of rodents (e.g., mice exposed to gamma rays at Oak Ridge National Laboratory). In addition, NRA received a large donation of the supportive documentation for *Radioactivity and Health: A History*, by J. Newell Stannard. Also slated is an oral history interview with Stannard, who was a pioneer in research on health effects of radioisotopes.

The archives provides researchers with materials for analysis by advanced molecular biology techniques and with information for statistical analysis so that the results of these studies can be compared with others. Its computerized information system provides access to data on each of more than 5,000 dogs, the document and specimen collection catalogs, and bibliographic citations.

Sandager's role in assessing this resource was to suggest how to care for and preserve the materials, how to distribute information and manage clinical records most efficiently, and how to decide what records were "vital" and should be backed up. NRA director C. R. "Chuck" Watson, who has a background in physics, history of science, and health software engineering, invited Sandager to attend an advisory committee meeting at PNL. Sandager first toured the archives to learn more about NRA holdings from Watson and his staff, archival administrator Earleen Ligotke and software engineer Sean Smith. She also presented a seminar on CHF's documentation strategy for the Human Genome Project to PNL scien-



A beagle genealogy chart and diskettes accessing materials preserved in the National Radiobiology Archives.

tific staff and records management specialists.

The NRA's advisory committee consisted of scientists from laboratories participating in the project and from four other universities. They discussed a critical issue facing both archivists and future users—how to preserve rapidly deteriorating physical specimens and highly acidic paper.

Sandager emphasized the importance of striking a balance between preservation and use of the materials. New imaging and scanning technology can preserve information found in the clinical record: indeed, the NRA staff has already developed a demonstration diskette, which has been distributed to participating labs. The tissue archives diminishes every time a researcher takes a sample, however, as in the research on Alzheimer's disease for which scientists are even now taking samples. NRA might implement an agreement that whenever a sample is taken out of the archives, the user will give something back—such as a pathologist's report or other data. The committee concurred with both these suggestions.

The committee was able to learn from the "user" perspective as well. Mike Russell, a genomics researcher at the University of California at Davis, spoke about the importance of beagle dog studies to his work on Alzheimer's disease. He explored the reasons for choosing beagles as experimental subjects, the uniqueness of the NRA population, the importance of clinical records in examining familial relationships, and the behavioral tests being done on old dogs.

But advisers also discussed the value of NRA's collections to history. Potential users will want to examine the research activities in the overall context of the laboratories. How do we document such aspects as the "culture" of the lab? How did each lab operate and did different leadership styles affect productivity and efficiency? Cooperative planning with other institutions involved in radiation studies will be essential to capture these aspects. Watson has already met with Special Collections staff members at the University of Tennessee, who also collect in this subject area.

The visit to the laboratories at Richland exemplified the kind of outreach that is central to the Beckman Center's BIMOSI Program. Sandager's advice and guidance to this group will help both scientists who have an immediate need for the archival information from the dog studies and historians interested in the postwar development of radiation biology. Her visit therefore reflected BIMOSI's dual commitment to the scientific community, and to the community of scholars who study it.

ELIZABETH E. SANDAGER
CHF and Harvard University

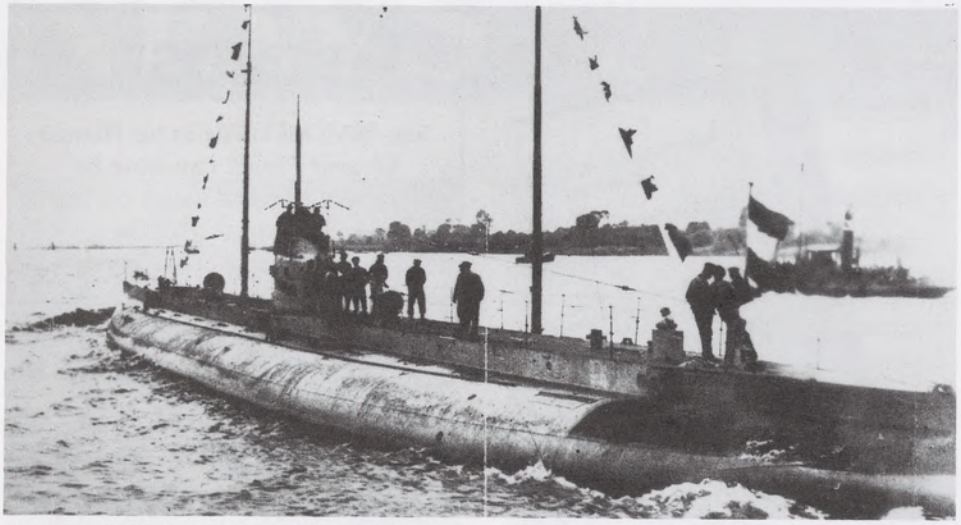
BIMOSI

The BIMOSI *Guide to the Human Genome Project* can now be ordered. See the insert on our publications and the accompanying order blank.

Celebrity DNA

At a workshop jointly sponsored by CHF and the University of Pennsylvania's Department of the History and Sociology of Science, Susan Lindee, who holds positions in both, spoke on "Immortal Coils and Celebrity DNA: The Gene as Sacred Object in Popular Culture." Her paper, part of a study with sociologist Dorothy Nelkin of New York University, explored images of immortal DNA and the promotion of DNA as a molecular "relic" in newspapers, fiction, film, and advertising. Lindee suggested that DNA has become the cultural equivalent of the immortal soul, often serving as a boundary marker between life and not-life, human and not-human, self and not-self. Its social power, she noted, derives in part from its relation to Christian ideas about immortality, the soul, and original sin. Its threat lies in its adaptability to a socially sanctioned system of reproductive control mediated by the images and narratives of the popular media.

The name of the perfume DNA is used in this ad to assert that buying it is as inevitable as inheriting a parent's genes.



The U-boat Deutschland in 1916 evaded the blockade to transport dyes into Baltimore harbor. From Dwight R. Messimer, The Merchant U-Boat: Adventures of the "Deutschland," 1916–1918 *(Annapolis, Maryland: Naval Institute Press, 1988). Courtesy of the United States Naval Institute.*

The German Chemical U-Boat

Late in the evening of 9 July 1916, a German U-boat chugged into Baltimore harbor, docked at a specially built warehouse, and captured the American imagination. With World War I still primarily a European affair, neutral America marveled at the daring crew of the *Deutschland*. The Germans wagered that a new class of large, unarmed merchant submarines could transport goods between the United States and Germany through the British blockade. Wild speculations emerged about the submarine's cargo, despite early and official announcements that the *Deutschland* carried synthetic organic dyes and pharmaceuticals. On 10 July the *New York Times*, one of the saner commentators, suggested that the *Deutschland* delivered financial securities, a message from the Kaiser to President Wilson, and maybe even important diplomatic passengers. Other rumors said the sub's return cargo included gold and silver.

Perhaps most Americans felt more intrigued by the submarine's adventure on the high seas than by its cargo, but a key segment of American industry let out a joyful noise at the shipment of synthetic organic chemicals. Before World War I nearly all of the synthetic dyes, pharmaceuticals, and related organic chemicals consumed in the United States came from Germany. At the outbreak of the war in Europe, Germany diverted to explosives some chemicals usually destined to become dyes for export. Moreover, the increasingly effective British blockade cut commerce between the United States and Germany to a trickle, and then halted it altogether. U.S. industries dependent on dyes, particularly the large textile industry, suffered from a dye famine, complete with a rationed, less-varied diet of colors. For some even the relatively tiny submarine shipment meant relief, if only momentarily.

The *Deutschland* certainly provided the most colorful, if not the most promising, answer to the dye crisis. The natural dyes industry, almost entirely obsolete by 1914, revived under the stimulus of wartime demand and contributed a significant amount of dyestuffs. But neither the submarine load nor the second life of natural dyestuffs promised the long-lasting relief that many sought. A significant group of chemists, industrialists, and government officials argued that the United States should instead build its own synthetic organic chemicals industry, freeing the country from dependence on foreign supplies of chemicals used in dyes, medicinals, plastics, poison gases, and explosives. Among the strong proponents of a domestic industry, chemicals companies such as Du Pont and the predecessors to Allied Chemical loomed large, but strong personalities among the ranks of chemists also provided vocal and influential support. In addition, the chemical similarities between dyes and explosives made the military and others concerned with national defense staunch supporters of chemical independence.

Not everyone wanted the United States to develop its own synthetic organic chemicals industry. The textile industry, a major consumer of German dyes for decades, supported domestic efforts to supply dyes for the duration of the war, but its representatives generally remained skeptical that Americans could produce the quality and range of dyes they desired. Importers of German chemicals naturally wanted to retain their lucrative business. Finally, the strong political sentiment for free trade worked against the protectionist legislation that industry supporters saw as essential to establishing domestic dye production.

These powerful interest groups clashed repeatedly in the press and in legislative battles throughout the war and the following years. The struggle was fierce not only because the economic and political stakes were high but because the atmosphere of the war years was intensely xenophobic. Supporters of the chemical industry took the patriotic high ground and labeled the opposition German agents. The opposition claimed that American chemical consumers would suffer at the hands of a protected American chemical monopoly producing inferior products at inflated prices. Each side had its gains, but the industry benefited more from the wartime crisis and rejoiced when the U.S. government confiscated German chemical property, patents, and trademarks.

The *Deutschland* arrived early in this whirl of industrial politics. Herbert Dow, not surprisingly an advocate of the American chemical industry, wrote to Charles H. Herty a month later that the submarine was a German technique to discourage American dye manufacturers. He felt that the size of the submarine's cargo was virtually negligible, but the symbolic and psychological impact was potentially very damaging, given the politically precarious position of the chemical manufacturers. Dow believed the submarine held out just enough hope for a renewed supply of German dyes to make textile manufacturers hesitate to back domestic chemical producers, Congress resist passing protective legislation, and investors de-

sert the chemical industry for more promising returns elsewhere. Finally, even the American chemical manufacturers themselves could lose faith in their future and become more timid in their new ventures. Dow also commented that the submarine indicated the extent of German respect for America's ability to manufacture its own synthetic organic chemicals, but he took small comfort in the compliment (Dow to Herty, 12 August 1916, C.H. Herty papers, Woodruff Library, Emory University).

Dow's fears proved mostly unfounded. The *Deutschland* managed the return voyage to Germany safely and executed a second run in November 1916 before relations between Germany and the United States deteriorated beyond repair. The following February the submarine went into port to acquire weapons for war, and it eventually sank several Allied ships before retiring and becoming postwar scrap. The American synthetic organic chemicals industry suffered a different fate. Bolstered by a variety of measures during and shortly after the war, the industry grew to compete successfully in the world market. High protective tariffs and an import licensing system that excluded many German chemicals helped. In addition, the government sold confiscated German patents to the nonprofit Chemical Foundation, which subsequently licensed them to American-owned firms. The number of organic chemists graduated from American universities, which had been increasing before the war, grew at a faster pace after it, as did the number of industrial research laboratories. A dozen years after the *Deutschland* made its unique transatlantic crossing, the synthetic organic chemicals industry had established a firm foundation and would soon issue a range of new products, including synthetic fibers and plastics. Without World War I, in which U-boats made their debut as menacing instruments of warfare, these developments might not have occurred so swiftly.

KATHRYN STEEN
University of Delaware
Edelstein International Student

Theodor Benfey and Kathryn Steen with an indigo sample from the Deutschland *now in the CHF collections.*

Historians of Chemistry: Eva Armstrong and Edgar Fahs Smith

Edgar Fahs Smith was a noted pre–World War I chemist, a provost of the University of Pennsylvania, a collector of books and historic artifacts, a historian of chemistry, and remotely a progenitor of the Chemical Heritage Foundation. He is rightly regarded as one of the founders of the discipline of chemical history, and with C. A. Browne and others he was responsible for organizing the American Chemical Society Section, later Division, of the History of Chemistry. These facts are well known to most readers of this newsletter.

But how many readers would recognize the name of Eva V. Armstrong, who probably contributed more to the beginnings of the history of chemistry than her illustrious employer, Edgar Fahs Smith?

Eva Armstrong came to EFS as his secretary in 1909 when she was about thirty, after graduating from Atlantic High School and working as a secretary and foreign language tutor for several years. Her pictures and surviving correspondence suggest that she was proper and precise, her manner reserved. It must have been something of a shock to her to go to work for EFS. Immensely popular with Penn students and Philadelphia citizens, prolific in his writings and public pronouncements on many subjects in addition to chemistry, Smith was looked up to as one of Pennsylvania's outstanding citizens. He was gregarious and enormously energetic, with a prodigious memory. His surviving papers indicate that during the first years Armstrong was his secretary, he led a busy life administering the university, heading the old-boy network of the American Chemical Society as president, officer, and frequent contributor of papers, and traveling and speaking widely. He was the recipient of more than twenty honorary degrees and a member of many foreign scientific societies and fraternal organizations in this country. Yet he actively pursued his early and lively interest in the origins of chemistry and American history, collecting "old chemistries," as he called them, and autographs and portraits of distinguished scientists and statesmen. Even after he left chemistry for administration, he continued to give a series of lectures on chemical history, which Eva Armstrong attended. He introduced, as he says, "a personal, human element" into his lectures. His historical writings reflect this personal touch; he often romanticized his heroes, yet he wrote with an easy charm that led the reader to ignore occasional historical deficiencies.

Eva Armstrong was soon caught up in Smith's enthusiasm for the history of chemistry. When he retired in 1920, she became his private secretary, and they began to collaborate actively in collecting and writing. She learned to scan dealers' catalogs and recognize items to fill gaps in Smith's burgeoning collection. She did much of the research for his books and articles and helped write them. At the time of his sudden death in 1928, the collection contained more than 13,000 volumes, prints, manuscripts, medals, and autograph letters. The collection's eclecticism is vividly illustrated in a photograph of his office in the Harrison Laboratory taken shortly after his death.

Armstrong was devastated by Smith's death. Not only did she depend on him

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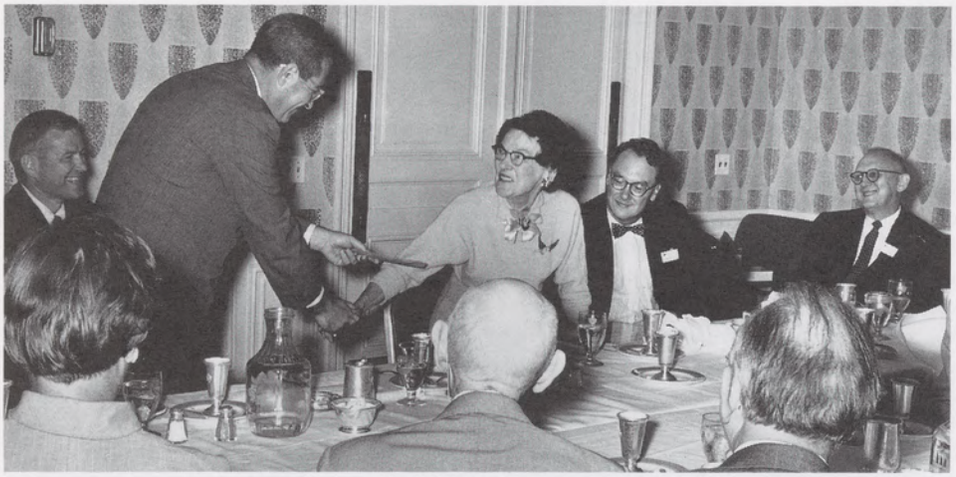


Eva Armstrong won the Dexter Award in the history of chemistry in 1958, the third person to win the award and the first woman so honored. At the far left is current CHF board chair Charles C. Price, who at the time was head of the Univeristy of Pennsylvania chemistry department. Sitting next to Eva Armstrong is Wyndham Miles, historian of science in government; next is Claude Deischer, Penn chemist and historian. Courtesy the Edgar Fahs Smith Collection, University of Pennsylvania.

ARMSTRONG—*continued*

as a mentor in what had become an absorbing search for the origins of chemistry, but he was a valued friend and colleague. Her loss of a livelihood and career seemed minor in comparison, as her letters show.

The university authorities found her another secretarial position, but she was gratified when Margie Gruel Smith, EFS's widow, gave his entire collection of books and memorabilia to the university, together with an endowment that provided a stipend for the curator and a small amount for upkeep and acquisition. It was understood between Mrs. Smith and Miss Armstrong that the latter would be the curator. The Edgar Fahs Smith Memorial Collection thus became a reality, and was established in Smith's old office in Harrison Laboratory.

Eva Armstrong at first tentatively, and then with increasing confidence and ability, entered the rather small and intimate circle of historians of chemistry. She knew most of them; they had visited EFS and had been associated with him in the founding of the History of Chemistry Division of the ACS. She had supplied them with copies of photos from Smith's collection and collaborated with some of them on journal articles and ACS presentations. By this time (the 1930s) the Smith Collection was world renowned, attracting visitors and requests for information from the international chemical community. The correspondence files of the Smith Collection are full of requests and faded carbon copies of Armstrong's responses, always inviting the writer to visit, always providing generous help whenever possible from the collection on subjects that ranged from alchemical hieroglyphs to Joseph Priestley's invention of carbonated water to early industrial chemistry in this country. Her correspondents included C. A. Browne, Frederick Brasch, Tenney Davis, Sidney M. Edelstein, Henry M. Leicester, Wyndham Miles, Elvira Weeks, George Sarton, and well-known chemists and editors such as Harrison Howe, Charles Parsons, Alden Emery, Lyman Newell, and Pierre S. Du Pont.

It was a dream cherished by EFS and kept alive by Armstrong and some of the early historians of chemistry that someday they would establish a periodical devoted solely to the history of chemistry, international in coverage. This dream simmered fitfully during the 1930s and had to be postponed during the war years. It began to be implemented in 1946, as Eva Armstrong, Tenney Davis, Henry Leicester, and University of Pennsylvania officials met and corresponded about publishing an "annual." The first volume of *Chymia: Annual Studies in the History of Chemistry* appeared in 1948, with a foreword by Armstrong. Davis edited the second volume; after his death in 1949 Henry Leicester took over. Beginning with Volume 2 Eva Armstrong is listed as Secretary to the Board of Editors. Judging by the *Chymia* archives in the EFS collection, she was the adhesive of the editorial office, holding the publication together by bestowing coherence and uniformity on polyglot contributions of widely varying quality.

After she retired in 1949, she visited the collection regularly, advising her successors and assisting researchers in mining information from its extensive holdings. This is attested by the credit given her in books and in articles in *Chymia* and other periodicals by their authors.

Her devotion to one man and then to one all-absorbing interest precluded a personal life outside the confines of the Smith Memorial Collection and *Chymia*. She lived modestly with her sister in suburban Philadelphia, rarely venturing travel outside the state. Her bibliography lists twenty contributions, most written during the 1930s and early 1940s, before she took up the heavy editing responsibilities of *Chymia*. Many of her early articles concern, quite naturally, the Edgar Fahs Smith Collection. Several appeared in the *Journal of Chemical Education*, which served as a publication vehicle for the history of chemistry before *Chymia*. With C. A. Browne, she wrote on "History of Chemistry in America" (1942), while at least the germ of feminism must have informed her "Jane Marcet and Her *Conversations in Chemistry*" (1938). Her style was a perhaps-unconscious imitation of Smith's rather flowery "personal touch."

In recognition of her pioneering organizational efforts in the history of chemistry and her devotion to the discipline through assistance to others over a period of thirty years, Eva Armstrong was awarded the Dexter Chemical Corporation Award in the History of Chemistry in September of 1958.

Her life, ending in 1962, spanned a period when the history of chemistry and the history of science were coming into their own as intellectual enterprises. Eva Armstrong's contribution to this development and her advance from secretary to historian were remarkable and worthy of our commemoration as beneficiaries of her work.

ELEANOR MAASS
Maass Associates

This article is based on Claude Deischer's memorial to Eva Armstrong in *Chymia*, 10 (1965), 13–17, and on correspondence in the papers of the Edgar Fahs Smith Collection.

GRANTS & AWARDS

New Edelstein International Fellow and Student

The Edelstein International Fellow in the History of the Chemical Sciences and Technologies for 1993–94 will be Owen Hannaway, professor of the history of science at the Johns Hopkins University. Hannaway will carry out research at the Beckman Center for the History of Chemistry on the campus of the University of Pennsylvania and at the Edelstein Center for History and Philosophy of Science, Technology, and Medicine at Hebrew University in Jerusalem. He will study Georgius Agricola, the sixteenth-century humanist writer and student of chemical and mining technology; he will also explore the history of chemical laboratories. Previous Edelstein International Fellows were Kostas Gavroglu, National Technical University of Athens; Peter Morris, National Museum of Science and Industry (UK); William H. Brock, University of Leicester (UK); and Seymour H. Mauskopf, Duke University.

The new Edelstein International Student will be James Altena, a graduate student at the University of Chicago. Altena will hold the studentship in Philadelphia and in Jerusalem, working on his dissertation, "Science, Philosophy, and Social Reform in Imperial Germany," which focuses on the energism of Wilhelm Ostwald. The previous holder of the Edelstein Studentship was Kathryn Steen, a Ph.D. candidate in the history of technology in the Hagley Program at the University of Delaware.

Grants and Fellowships

■ The American Philosophical Society invites applications for a doctoral dissertation fellowship in the history of the physical sciences in the twentieth century. The **John Clarke Slater Fellowship** carries a stipend of $12,000. It is open both to candidates for the doctorate in the United States and to those in universities abroad who propose to spend the fellowship year in association with an American university or appropriate research institution. The deadline is 1 December for the following academic year. Write to American Philosophical Society, Slater Fellowship, 104 South 5th Street, Philadelphia, PA 19106-3387.

■ The DeWitt Stetten, Jr., Museum of Medical Research at the National Institutes of Health invites applications for its **Stetten Memorial Fellowship** in the history of twentieth-century biomedical sciences and technology. The fellowship will support either one year of dissertation research or up to one full year of postdoctoral work for a fellow in residence at the museum. The annual stipend will range from $12,000 to $17,000 for a predoctoral appointment and from $25,000 to $28,000 for a postdoctoral appointment. The deadline is 15 December. Write to Dr. Victoria A. Harden, Director, DeWitt Stetten, Jr., Museum of Medical Research, Building 31, Room 2B09, National Institutes of Health, Bethesda, MD 20892; telephone (301) 496-6610; fax (301) 402-1434.

■ The Society for the History of Alchemy and Chemistry recently established the **Partington Prize,** in memory of James Riddick Partington. The prize of £200 is awarded every three years for an original and unpublished essay on any aspect of the history of alchemy or chemistry. Partington was the society's first chair, a post now held by William Brock, Edelstein Fellow at CHF for 1991–92.

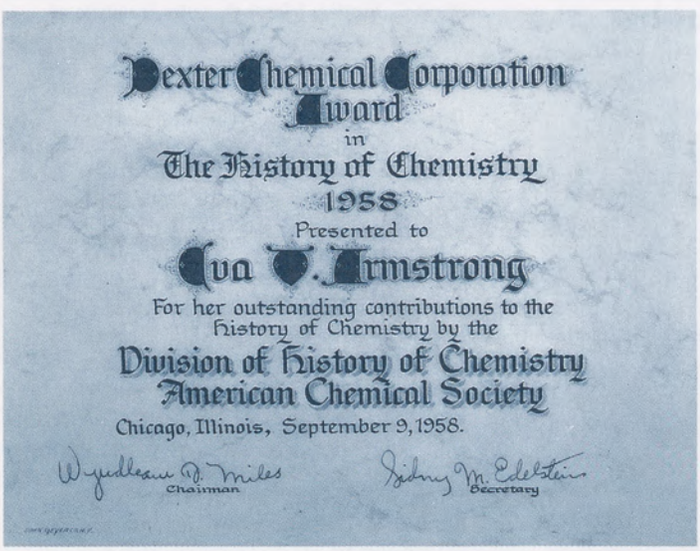
The competition is open to anyone with a scholarly interest in the history of alchemy or chemistry who has not reached thirty years of age by the closing date, 31 December 1993. Essays must be in English, not exceed 5,000 words, and be fully documented following the conventions used in recent issues of *Ambix*. The prizewinning essay will be considered for publication in *Ambix*, but publication cannot be guaranteed. For complete information write Dr. A. K. Newmark, The Science Museum, South Kensington, London SW7 2DD, England.

■ The National Endowment for the Humanities' Division of Education Programs, the National Science Foundation's Division of Undergraduate Education, and the Fund for the Improvement of Postsecondary Education in the Department of Education invite applications for the development of courses linking the sciences and the humanities. They should be based on collaboration of faculty in the sciences and the humanities. For information contact the NEH Division of Education Programs, telephone (202) 606-8380.

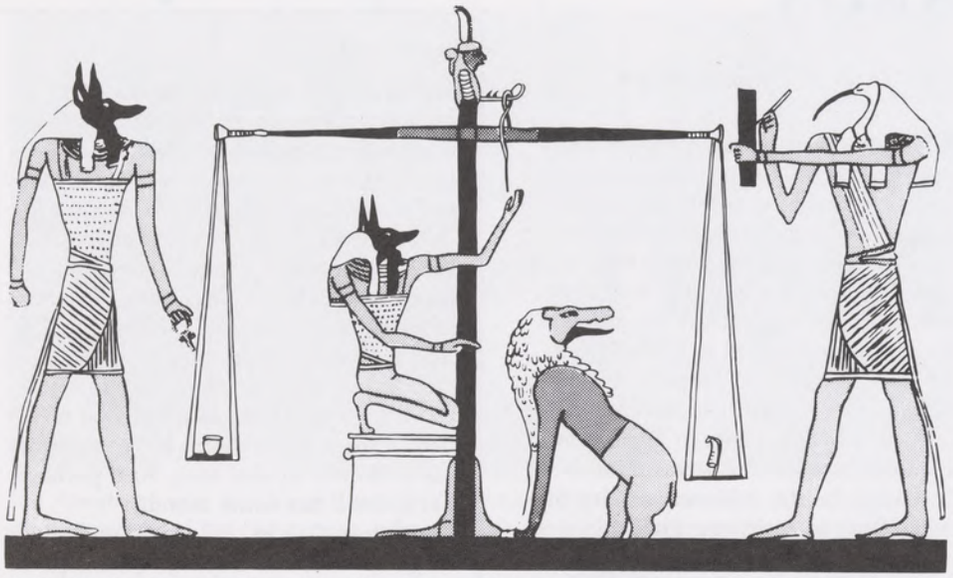
Inspiration

One day I was sitting in the car while my wife was on an errand. For some months I had had some basic information from the laboratory that was incompatible with everything that, until then, I knew about the [carbon] cycle. . . . And suddenly in a matter of seconds, the cyclic character of the path of carbon became apparent to me. So, there is such a thing as inspiration, I suppose, but one has to be ready for it. I don't know what made me ready at that moment, except that I didn't have anything else to do but sit and wait. And perhaps that in itself has some moral.

—**Melvin Calvin.** *Following the Trail of Light: A Scientific Odyssey.* Washington, D.C.: American Chemical Society, 1992. (Profiles, Pathways, and Dreams, ed. J. I. Seeman.)



The Dexter Award presented to Eva Armstrong. Courtesy the Smith Collection.



In his Dexter Award address John Stock surveyed instrumentation from the balances of ancient Egypt to our own time. Courtesy John Stock.

The Dexter Award: John Stock in Search of Chemical Instruments

Under the title "Historic Chemical Instrumentation: From the Cellar Upwards," John Stock of the University of Connecticut and the Science Museum, London, presented his Dexter Award address to the ACS Division of History of Chemistry. Two excerpts are given here and the complete lecture will appear in the Bulletin for the History of Chemistry.

I realized that I knew little about the history of potentiometric titration, except that it had been introduced by Behrend in 1893. On inquiring, I found that Robert Behrend (1856–1926) began by studying law, quickly changed to physics, and then decided to become a chemist. In 1877 he went to the University of Leipzig, where he was interviewed by the celebrated organic chemist Hermann Kolbe, who turned him down. This was because Behrend did not even know the formula of saltpeter! However, he was accepted by a physical chemist and, four years later, obtained his doctorate, summa cum laude. Behrend went on to publish some one hundred papers. With one exception, these dealt with various topics in organic chemistry. The exception was an 1893 paper which ended with his description of the first potentiometric titrations. Apparently, Behrend did this work because of apparatus made available to him by his colleague Wilhelm F. Ostwald. . . .

Another conclusion has almost blossomed into "Stock's Law." This is "A scientist's instruments are his successors' junk." For years, I have been urging anyone thinking of scrapping an instrument to check before execution. The item in question my be the last of its kind; if it is a prototype, it is historically unique! A species can be numerous, but can still face extinction. Thousands of flue-gas analyzers were, and are, in use. Some years ago, a leading British engineering journal published my request for news of the whereabouts of a pre-1930 analyzer. I still await the first response. I suppose that I should go hunting in boiler houses when I travel around. However, I want to push on with other projects, so I think that I will let this one go. I may yet stumble upon the needful when looking for something else!

The Dexter Award, given annually by the American Chemical Society's Division of History of Chemistry, honors outstanding accomplishment in the history of chemistry. For instructions or to send nominations (due 1 January 1994) write Derek A. Davenport, Chemistry Department, Purdue University, West Lafayette, IN 47906-1393.

CHF Council of Friends

The Council of Friends was created as a means by which the Chemical Heritage Foundation might draw on and communicate with the varied segments of the chemical community more extensively. Members of the Council of Friends are individuals distinguished for their diverse contributions to the progress of the chemical sciences and technologies. Each is identified in this list by one principal affiliation, past or present.

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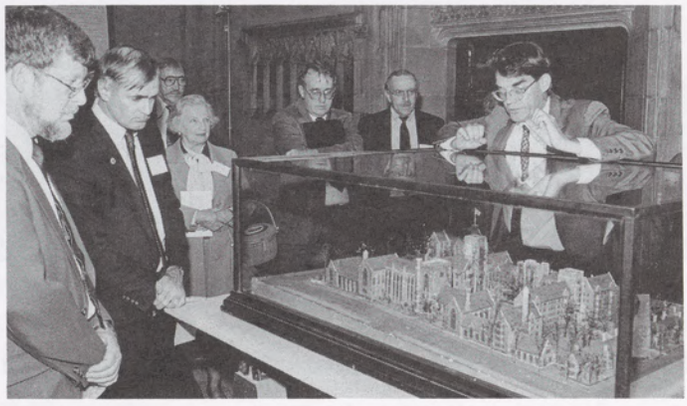
NEWS from the Donald F. & Mildred Topp Othmer Library of Chemical History

Realizing a Dream . . .

Donald Othmer is greeted on arrival by John C. Haas . . .



. . . then inspects the design of the chapel's furnishings with architect Richard Meyer.

Architect Meyer (far right) explains the plans to the guests. From the left: Ned Heindel, ACS president-elect; Christopher Mason, director of the University of Pennsylvania's real estate office; Stuart Hill, a chemical engineer at Penn; Anne Price, wife of CHF board chair Charles C. Price; Amos Smith, a chemist at Penn; and Scott Lederman, university treasurer.

I foresee the realization of a big dream—the Othmer Library. ***Don Othmer***

THE ABOVE WORDS in Donald Othmer's handwriting graced the invitation from Don and Mid Othmer. Friends of the Chemical Heritage Foundation were invited to Philadelphia for the unveiling on 27 October of a plaque in the former Philadelphia Divinity School renaming it The Donald F. and Mildred Topp Othmer Library of Chemical History. The festive occasion in the chapel began with a presentation by the architect Richard Conway Meyer, including scale models and drawings of the Othmer Library's future home. Sheldon E. Isakoff of the American Institute of Chemical Engineers greeted the assembled company on behalf of CHF; Scott C. Lederman, treasurer of the University of Pennsylvania, hailed the growing partnership of CHF and the university; and John C. Haas of Rohm and Haas, on behalf of the Othmer Challenge Committee, spoke of the Othmers' vision and of the generosity of spirit undergirding this new venture by the chemical community. The highlight of the occasion came with Donald Othmer's remarks on the eventful century in which he has lived, and culminated in the unveiling of the plaque with the building's new name.

After unveiling the plaque of the Othmer Library of Chemical History, Donald Othmer toasts the momentous step with Penn's Scott Lederman . . .

. . . a toast joined in by the assembled company.

Linus Pauling, right, is interviewed for his CHF oral history by Jeffrey L. Sturchio, now at Merck.

Found in the Othmer Library IV: Pauling's *Chemical Bond*

One of the delights of the Othmer library is that it seeks to own a copy of each edition of an author's publications. Linus Pauling's works are no exception—and tales can be told about different editions of at least one of them.

As soon as Pauling received a copy of the first edition of *The Nature of the Chemical Bond*, he sent it to G. N. Lewis.[1] Pauling had dedicated the book to Lewis, the person who, he repeatedly stressed, had founded modern valence theory by his daring proposal that the covalent bond could be understood in terms of shared electron pairs. Lewis was undoubtedly gratified. He wrote Pauling on 25 August 1939: "I have returned from a short vacation for which the only books I took were a half dozen detective stories and your 'Chemical Bond.' I cannot tell you how much I appreciate having a book dedicated to me which is such a very important contribution. I think your treatment comes nearer my own views than that of any other authors I know and there are very few places where I could possibly disagree with you, and those perhaps because I have not thought about them sufficiently."[2]

The book is the published version of lectures Pauling gave during his tenure in the fall semester of 1937 as a George Fisher Baker Non-resident Professor of Chemistry at Cornell University—as noted by William H. Brock in "Baker's Dozens" in an earlier issue of this newsletter (9:2/4:2, Summer 1992, p. O-3).

By 1937 Pauling had completed his seven classic papers, all titled "The Nature of the Chemical Bond." Although the papers treated the problem mathematically, the book does not. More than any other work, it educated generations in the use of quantum mechanics in structural chemistry not by emphasizing the abstruse mathematics, but by convincing chemists that "with practice there can be developed an extended chemical intuition which permits the new concepts to be used just as confidently as the older ones."

In the third edition (1960), Pauling added a new section, titled "The Nature of the Theory of Resonance," to the sixth chapter. It is perhaps the most philosophical of all of his writings; it reflects reactions to his ideas and the evolution of his thought.

In 1950, a group of chemists in the Soviet Union—the Commission of the Institute of Organic Chemistry of the Academy of Sciences, for the Investigation of the Present State of the Theory of Chemical Structure—viciously attacked Pauling's theory of resonance. As they themselves stressed, their main objection was methodological; they could not accept that by starting from conditions and structures that did not correspond to reality, one could arrive at meaningful results. They adduced the work of A. M. Butlerov, who in 1861 had proposed a materialist conception of chemical structure: the distribution of the action of the chemical force, known as affinity, by which atoms are united into molecules. He insisted that any derived formula should express a real substance, a real situation. Pauling was moving along a different path. For him, a chemical bond existed between atoms if the forces acting between the atoms led to the formation of an aggregate with sufficient stability to make it convenient for the chemist to consider it an independent molecular species. Pauling's operational definition was totally

Books and Gifts Keep on Coming

■ From **Bernhard Witkop** of NIH has come a beautiful 1858 edition of Michael Faraday's *Experimental Researches in Chemistry and Physics*.

■ **Charles L. Levesque** of Blue Bell, Pennsylvania, sent us a copy of "Electronic Theories" by **William Albert Noyes** (*Chemical Reviews*, 17 [1935], 1–26) autographed by the author for Levesque, his graduate student. Noyes, the ACS Priestley Medalist in 1935, brought Roger Adams and Carl "Speed" Marvel to join him at the University of Illinois. Noyes points to the need to look at all aspects of his topic, such as instrumental data, theories old and new, and earlier conclusions from organic structural studies. In a fascinating aside that reveals his internationalist bent, he warns that too narrow a view is as likely to be disastrous in chemistry as in politics, when statesmen are concerned only for their own nation and ignore the interests of others.

■ **Robert J. Maleski** of the Tennessee Eastman Division of Eastman Kodak Company sent us "The Origin of Holston Army Ammunition Plant," a breathtaking account of Tennessee Eastman's mass production in World War II of "Composition B," an antisubmarine explosives mixture of RDX and TNT. The company first devised a continuous process for making RDX, and in less than two years daily production of Composition B was 570 tons, with no serious injury or death at any time. The story, dated 10 September 1975, is in the form of a reprint of the remarks made at a meeting of a Rotary Club by R. C. Burton, Eastman Kodak vice-president until 1974. During the scaling-up operation, the liaison between Tennessee Eastman and the National Research Defense Council was Ralph Connor, who is commemorated by CHF in its annual Ralph Connor lecture.

unacceptable. "In this treatment the objective criterion of reality of the molecule and of the chemical bond vanishes. Since the definition of the molecule and the chemical bond given by Pauling is methodologically incorrect, it naturally leads, when logically developed, to absurd results."[3] Not all Soviet scientists shared these sentiments. The same article attacked Y. K. Syrkin and M. E. Dyatkina, who had written the excellent book *Structure of Molecules and the Chemical Bond* and had translated Pauling's book into Russian.[4] And an editorial note to the report itself asserted that any particular way of dealing with chemical phenomena should not be excluded *a priori*, but should first be closely studied.

In 1955 George Willard Wheland, a former student of Pauling's and one of the strongest propagandists for resonance theory, published the second edition of his *Theory of Resonance and its Application to Organic Chemistry*. Appropriately, Wheland dedicated the book, first published in 1944, to Pauling. His view was that "resonance is a man-made concept in a more fundamental sense than most other physical theories. It does not correspond to any intrinsic property of the molecule itself, but instead it is only a mathematical device, deliberately invented by the physicist or chemist for his own convenience."[5] In 1944 Pauling did not seem to disagree with Wheland's assessment. But when the later edition appeared, the two began a lively correspondence about the actual character of resonance theory. Wheland wrote on 20 January 1956 that he thought that resonance was not an intrinsic property of a molecule but instead "something deliberately added by the chemist or physicist who is talking about the molecule. In anthropomorphic terms, I might say that the molecule does not know about the resonance in the same sense in which it knows about its weight, energy shape and other properties that have what I would call real physical significance." Pauling disagreed. On 26 January he replied: "I feel that in your book you have done an injustice to resonance theory by overemphasizing its man-made character." Their correspondence continued, but neither could convince the other.

This insistence on the artificiality of resonance—even by those who favored using it—led Pauling, when he was preparing the third edition of his book, to include a full discussion of his views on the matter. His main purpose was to argue that the character of the theory of resonance was essentially identical with the classical structure theory of organic chemistry. He expressed these thoughts publicly for the first time in his acceptance speech on receiving the Nobel Prize for Chemistry in 1954. The thoughts took their final form in this remarkably lucid and convincing section of his book, in which Pauling argues that the greatest advantage of resonance theory is that it makes use of structural elements already familiar to the chemist. "The theory should not be assessed as inadequate because of its occasional unskillful application. It becomes more and more powerful, just as does classical structure theory, as the chemist develops a better and better chemical intuition about it."[6]

KOSTAS GAVROGLU
National Technical University Athens
Edelstein International Fellow

1. (Ithaca, N.Y.: Cornell University Press, 1939).
2. Pauling Archives, Oregon State University Library.
3. D. N. Kursanov et al: "The Present State of the Chemical Structural Theory," trans. I. S. Bengelsdorf, *J. Chem. Educ.* 29 (1952) 2–13; see also V. M. Tatevskii and M. I. Shackhparanov, "About a Machistic Theory in Chemistry and its Propagandists," trans. Bengelsdorf, *ibid.*, 13–14.
4. 1946; English translation, New York: Interscience Publishers, 1950. See also I. M. Hunsberger, "Theoretical Chemistry in Russia," *J. Chem. Educ.* 31 (1954) 504–514.
5. (New York: John Wiley, 1944), p. 31.
6. (3rd ed. 1960), p. 219; see also p. 215, where Pauling cites his Nobel Prize speech.

ARCHIVES

CHF Archives

Charles G. Overberger. CHF's archival collections continue to expand. Another who made his mark in the polymer field, Charles G. Overberger, has donated archival materials to CHF, where they join the papers of polymer greats William J. Bailey, Daniel F. Fox, Paul J. Flory, and Carl "Speed" Marvel. Overberger and Charles C. Price were once co-editors of the *Journal of Polymer Chemistry*. Overberger was on the faculty of the Brooklyn Polytechnic Institute before moving to the University of Michigan, where his Michigan papers are housed. He has given CHF those papers and letters relating to his activities in professional associations, and we will describe them in a forthcoming issue.

Pressurized Shaving Cream. An unusual collection has come to us from Betty Rich of Poway, California: Irving Reich's legal briefs relating to a patent infringement case in the 1950s. Colgate-Palmolive Company was the defendant against charges that it infringed patent 2,655,480, filed by Reich, Joseph G. Spitzer, and Norman Fine, for pressurized shaving cream. Depositions by Irving Reich and Foster Dee Snell are included.

Labeled Compounds in Biochemistry. David B. Sprinson of the St. Luke's–Roosevelt Hospital Center sent us five volumes of collected reprints representing the beginning of biochemical investigations with labeled compounds. The

Continued on next page

Edelstein International Fellow Kostas Gavroglu, left, with CHF researcher Arthur Daemmrich at the entrance to the future home of the Othmer Library.

ARCHIVES—*continued*

reprints, grouped under such categories as "Metabolism of Proteins" and "Metabolism of Carbohydrates," document isotope investigations carried out at the Department of Biochemistry at Columbia University (College of Physicians and Surgeons) from 1934 to 1951. Many of the authors became widely known, for example, Konrad Bloch, Erwin Chargaff, Mildred Cohn, David Rittenberg, Rudolf Schoenheimer, and Vincent du Vigneaud.

Papers on Beckman Instruments. E. N. "Ned" Brandt, Company Historian at the Post Street Archives, Midland, Michigan, has sent us catalogs and related papers describing Beckman instruments, ranging from the well-known DU spectrophotometer and pocket pH meter to less familiar items—flow calorimeters and "standard electromechanical breadboard parts." They come from the papers of former Dow Chemical Company researcher Ormond Barstow. He was the son of Edwin O. Barstow, hired by Herbert H. Dow in 1900, who considered him his "head research chemist."

Deischer Lecture Notes. James S. Falcone, Jr., of Devon, Pennsylvania, has donated his lecture notes from Claude Deischer's course in history of chemistry at the University of Pennsylvania, which he took in fall 1967. The notes move from ancient times to the present and include a dozen pages on literature searching, report writing, and patents. Claude Deischer, a member of the chemistry department, was for many years curator of the Edgar Fahs Smith Memorial collection.

Woodward Papers at Harvard

The Robert B. Woodward papers in the Harvard University Archives cover Woodward's life and career from his childhood to his death in 1979. Included are personal and family papers, professional correspondence, reports, manuscripts, research notes and data, teaching materials (e.g., examinations, course outlines), photographs, and files on graduate students and postdoctoral fellows. The papers relate to Woodward's teaching and research activities, his personal life, awards, and relations with professional groups and colleagues. A separate series of papers relates to the Woodward Research Institute in Basel, Switzerland. The bulk of the collection is in the three series titled "Professional Correspondence and Other Papers" (constituting 140 of some 220 containers in the collection). A description and folder lists are available for these parts of the collection.

Many of Woodward's notes and drafts are on poor-quality paper and have already deteriorated. Frequently the drawings are not identified by date or project, and the sequential relation of individual pages is not indicated, greatly complicating use of the collection and assessment of its contents. The archives has maintained the papers in the order in which they were received.

To preserve these papers, estimated to number in excess of 20,000, would require deacidification, for which funds are being sought. Many are works of art. They are important source materials for understanding RBW's pathways to the synthetic routes he finally chose.

The University Archives invites the advice of knowledgeable and interested chemists and historians of chemistry who are able to examine even small sections of the papers. They should contact Harvard's archivist, Clark Elliott, University Archives, Harvard University Pusey Library, Cambridge, MA 02138, telephone (617) 495-2462.

For information on CHF activities centered on Woodward, see page 19.

Philadelphia Resources

Edward B. Davis of Messiah College, a Boyle scholar and former Mellon Fellow at the Beckman Center, has made an inventory of Boyle editions found in Philadelphia. Those in the Edgar Fahs Smith Collection together with a few items in other collections at the University of Pennsylvania number over 150. Each of the other Philadelphia libraries has at least one edition not in the Smith Collection; the American Philosophical Society and the College of Physicians each have more than a dozen editions, the Free Library of Philadelphia has almost two dozen, and the Library Company of Philadelphia has almost 100. At least one English edition of every Boyle work can be found in Philadelphia except for the very rare *An Historical Account of a Degradation of Gold.*

PUBLICATIONS

Three Histories of Chemistry

William H. Brock. *The Norton History of Chemistry.* New York: W. W. Norton, 1993. 744 pp. $15.95, paper; $35.00, cloth. (Originally published as *The Fontana History of Chemistry.* London: Fontana Press, 1992. £8.99.)

John Hudson. *The History of Chemistry.* New York: Chapman & Hall, 1992. 285 pp. $24.95, paper; $59.95, cloth.

David Knight. *Ideas in Chemistry: A History of the Science.* New Brunswick, N.J.: Rutgers University Press, 1992. 213 pp. $18.00, paper; $47.00, cloth.

After a dearth of histories of chemistry—perhaps to be blamed on Aaron Ihde's magisterial achievement with his *Development of Modern Chemistry* (1964; fortunately once more available in a Dover reprint)—we suddenly are blessed with three new views of the emergence and growth of the chemical sciences. Each was written to interest not only present and future chemical practitioners but also the general student and the broader public. John Hudson's is the most like past histories, an account of chemical ideas, but does have a concluding chapter on chemistry and society that covers chemical industry, chemistry as a profession, and the hazards and benefits of the chemical age. The book brings the subject into recent times and seems very teachable.

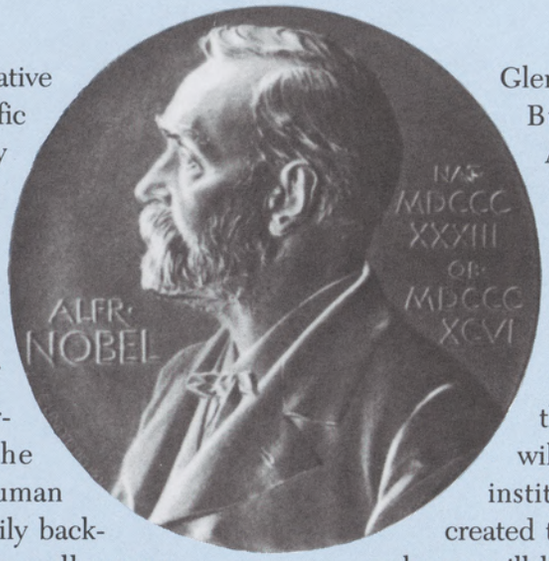
David Knight's is an impressive if impressionistic set of twelve essays—not on chemical ideas but on ideas about chemistry and the various roles the chemical sciences have played over the years. Among the organizing ideas: chemistry is considered as an occult and then as a mechanistic science; as a revolutionary, an experimental, a deductive, and a descriptive science; and as a teachable and finally as a service science.

The most detailed and far-reaching study is that of William Brock, who wrote much of it while he was Edelstein International Fellow here at the Chemical Heritage Foundation. He grapples with recent controversies, such as that over the classical carbonium ion; he describes the innovations in chemical education through the Nuffield, CBA, and CHEM Study projects; and he looks at the chemical sciences in their total cultural and social context.

Announcing the first volume in the History of Modern Chemical Sciences Series

NOBEL LAUREATES IN CHEMISTRY 1901–1992

Laylin K. James, Editor
History of Modern Chemical Sciences Series
Jeffrey L. Sturchio, Series Editor



This authoritative and informative volume examines the scientific achievements in chemistry for which the Nobel Prize has been awarded. Biographies of all 115 Nobel laureates, along with photos and references to the laureates' most significant publications provide a "snapshot" look at each of the scientists. In addition to exploring scientific achievements, the biographies also illuminate the human side of the individuals—their family backgrounds and lives. In many cases, colleagues, coworkers, or former students of the laureates have been enlisted as contributors, and all living laureates have reviewed their entries for accuracy.

Organized chronologically, *Nobel Laureates in Chemistry* takes the reader from J. H. van't Hoff, named the first chemistry laureate in 1901 for his work in chemical kinetics and osmotic pressure, to Rudolph Marcus, 1992 Nobel Prize recipient for his contributions to the theory of electron transfer reactions in chemical systems. Along the way readers will be fascinated by biographies of such notable researchers as Marie Curie, Dorothy Hodgkin, Irving Langmuir, Glenn Seaborg, Linus Pauling, Robert Burns Woodward, Emil Fischer, Alfred Werner, Ernest Rutherford, and many others.

Nobel Laureates in Chemistry is the first volume in the History of Modern Chemical Sciences Series. The series, co-published by the American Chemical Society and the Chemical Heritage Foundation, will document the individuals, ideas, institutions, and innovations that have created the modern chemical sciences. The volumes will bring the best historical scholarship on these topics to a wide audience among both the scientific community and the general public, providing the reader with a balanced view of the contributions chemistry and chemical technology have made to modern science and culture.

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Chemical Sciences in Society Series

From the University of Pennsylvania Press

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Fred Aftalion; translated by Otto Theodor Benfey; preface by Patrick McCurdy

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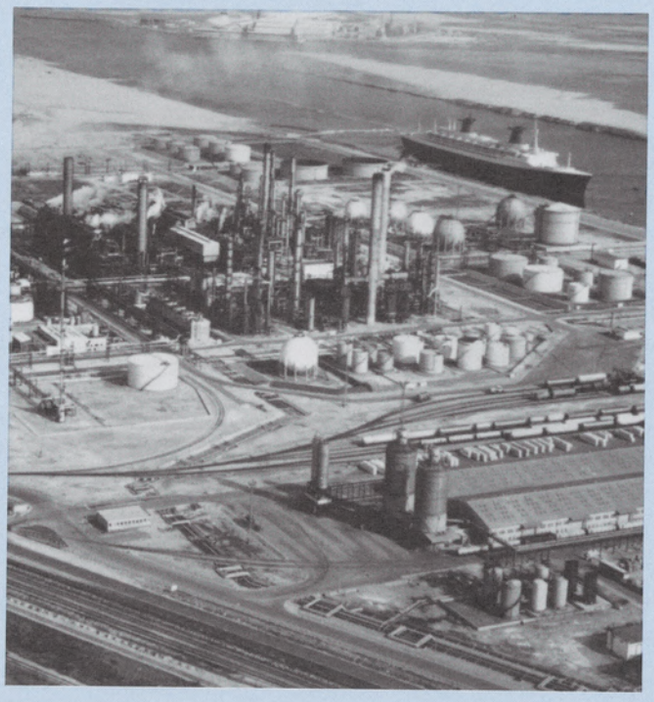
"Aftalion's masterly study presents an international perspective, integrates the story of chemical science with that of chemical industry, and emphasizes 20th-century developments. . . . He has packed an incredible amount of material into this vast, fascinating panorama of the contributions of ubiquitous, everyday products of literally hundreds of scientists and industrialists as well as hundreds of chemical companies in dozens of different countries, all admirably placed in their scientific and socio-political contexts"—*Journal of Chemical Education.*

1991. 440 pp, 48 illus. Cloth, ISBN 0-8122-8207-8, $44.95; paper, ISBN 0-8122-1297-5, $14.95



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Peter J. T. Morris; foreword by Arnold Thackray

"A very readable account of the war-time project . . . . This well researched and referenced book covers the technology of the development, which has its own fascination. But perhaps even more fascinating are the descriptions of the organizations and of the people involved in the program. . . . Morris has produced an excellent analysis of the lessons to be learnt from the story. His book should be made compulsory reading for anyone involved in such multi-party programs"—*Chemistry and Industry.*

"This book on the synthetic rubber program sponsored by the U.S. government demonstrates [Morris's] tenacious ability to seek out not only standard authorities but also a mass of relevant information not readily available, to record the recollections of surviving participants, to make a critical appraisal of it all and present the essence clearly and succinctly for the general reader"—*Ambix.*

1989. 204 pp. Cloth, ISBN 0-8122-8205-1, $38.95

Chemical Sciences in the Modern World

Edited by Seymour H. Mauskopf

It would be difficult to overestimate the importance of the chemical sciences to the modern world. In the last 150 years, they have transformed our physical environment, our material culture, our manner of living, and even our persons—and they are continuing to do so in profound ways. Yet the detailed and systematic study of the history of the modern chemical sciences has been relatively late in coming.

This compilation of essays by leading scholars represents the first fruits of modern historical scholarship. The essays in Part One deal with the experimental generation of new chemical knowledge, the nature of theories about chemical knowledge, and the reception of new knowledge and theories by the chemical community. Part Two is devoted primarily to the development of modern industrial chemistry. Part Three is concerned with preserving archives and artifacts owned by public and private institutions, with making the history of chemistry accessible to persons interested but not trained in history, and with helping both policy-makers and the general public to understand policy issues involving the chemical sciences and industries through the insights provided by historical research. Part Four, the concluding section, discusses future prospects for the history of chemistry, addressing questions about methodology, audience, and new directions for research.

Chemical Sciences in the Modern World is sponsored by the Beckman Center for the History of Chemistry, established in 1982 at the University of Pennsylvania under the directorship of Arnold Thackray.

Fall 1993. 448 pages, 14 illus. Cloth, ISBN 0-8122-3156-2, $37.95

Photo: Total Chimie's petrochemicals complex in Gonfreville near Le Havre. Courtesy of Total Chimie.

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More From The Chemical Heritage Foundation

From Vital Force to Structural Formulas
O. Theodor Benfey

"[The] only available in-depth treatment of the development of structural organic chemistry to feature translated excerpts from the original literature."

– Journal of Chemical Education

Theodor Benfey's *From Vital Force to Structural Formulas* traces the transformation of organic chemistry from 1800 to the work of Archibald Scott Couper and August Kekulé. The book also notes the major gaps in the structural theory they developed that were filled by later chemists. First published by Houghton Mifflin in 1964 and reprinted by the American Chemical Society in 1975, this invaluable teaching tool is at last back in print.

1992. xii + 116 pp, figs.
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These original papers by Friedrich Wöhler, Justus Liebig, Auguste Laurent, Alexander William Williamson, Edward Frankland, August Kekulé, Archibald Scott Couper, J. H. van't Hoff, and J. A. Le Bel illustrate the thinking of the chemists who developed the concept of valence. Theodor Benfey's introduction, epilogue, and running explanatory footnotes clarify the story and highlight significant turning points. Originally published in the Dover series Classics of Science (1964).

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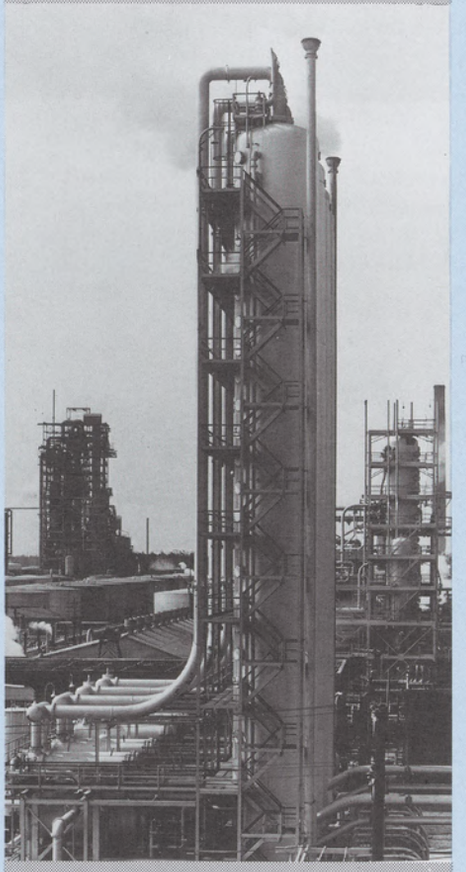

A naphtha-fractioning tower at Exxon's Baytown, Texas petroleum refinery, 1949. Courtesy Exxon Corporation.

CHEMICAL HERITAGE FOUNDATION

A Guide To The Human Genome Project: Technologies, People, and Information
Compiled by Susan L. Speaker & M. Susan Lindee, with Elizabeth Hansen

This simple, concise introduction to the HGP for the general reader explores the origins of the genome project and reactions in the scientific community; important technologies and techniques; institutions connected with the HGP, including designated genome centers, important suppliers of resources, and corporations; systems of communication; and ethical, legal, and social issues.

A publication of the Beckman Center BIMOSI project. Available in June 1993.
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Eric Elliot

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Basil Achilladelis & Mary Ellen Bowden

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1989. 36 pp, 8½ x 7½, ISBN 0-941901-07-6

Scaling Up: science, engineering, and the American chemical industry

John A. Heitmann & David J. Rhees

Scaling Up pays tribute to the engineers who transformed laboratory reactions into large-scale production facilities. The focus is on petroleum refining and penicillin production.

1984. 25 pp, 8½ x 7¾ , ISBN 0-941901-01-7

Joseph Priestley, Enlightened Chemist

David J. Rhees

The exhibit celebrating the 250th birthday of Joseph Priestley, on which this work is based, is now permanently at the Priestley House in Northumberland, PA.

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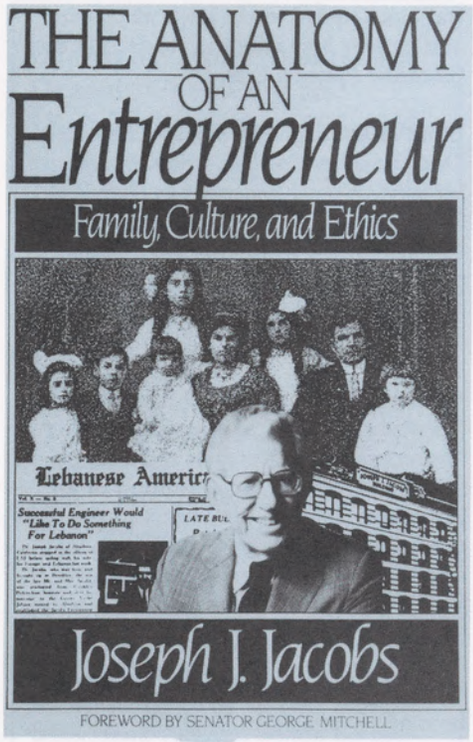


Roots of Success

Joseph J. Jacobs. *The Anatomy of an Entrepreneur: Family, Culture, and Ethics.* San Francisco: ICS Press, 1991. 274 pp. $24.95.

"By far the most important influence on me was Don Othmer," writes Joseph Jacobs of his adviser—then head of the department of chemical engineering at Brooklyn Polytechnic Institute (now Polytechnic University)—in his recently published autobiography. He "worked every evening and most weekends with a single-mindedness that yielded an outpouring of technical papers, usually coauthored by one or more of his thesis students"—Jacobs among them. Jacobs earned his bachelor and doctoral degrees at Poly and ultimately went on to found Jacobs Engineering Group, Inc., a major international engineering and construction firm in Pasadena, California, of which he is now chairman of the board.

The son of Lebanese immigrants, Jacobs traces many of his decisions and commitments to the influence of his family traditions. His book is far more than an account of his remarkably successful enterprise; it is a model of humane understanding and humanistic insight. It explores the principles that guide his business, describes the risks he took, and reflects on the lessons he learned from his failures and successes and on what it takes to succeed as an entrepreneur. A particularly engrossing section, "Back to My Roots," deals with his interest in helping the region of his birth. He describes in detail his initially unsuccessful bid to build a potash plant for Jordan at the Dead Sea. The story covers the competitive bidding, the unethical business practices of others, his meetings with King Hussein, and his ultimate vindication. The $450 million plant his firm constructed now produces over a million metric tons of potash per day. Jacobs includes a plea to the Arabs and Israelis to come to some form of accommodation.

The Manchester Lit and Phil

Manchester Literary and Philosophical Society. *Index to the* Memoirs *and* Proceedings, *1781–1989.* Manchester: Manchester Literary and Philosophical Publications, 1991. 390 pp. £55.00.

In a happy marriage of the ancient and the modern, the Manchester Literary and Philosophical Society has published a computer-based index to the treasures that have hitherto been all but impenetrably entombed in the two-century-long series of its *Memoirs* and *Proceedings.*

Readers of *Chemical Heritage* will need no reminding that the *Manchester Memoirs* saw the first publication to the world of John Dalton's atomic weights in 1805, or the first iteration of Ernest Rutherford's ideas on nuclear structure in 1911. However, they are not likely to know that here too may be found many publications of the noted chemist, communist, and pioneer historian of organic chemistry Carl Schorlemmer on subjects from "the origin of the word chemistry" to "the introduction of coffee into Arabia." And then there is the tantalizing clue that another noted Manchester chemist, Edward Schunck, wrote "Notes on Some Ancient Dyes" or the equally intriguing discovery that Henry E. Roscoe discussed "Bunsen's Analysis of Gunpowder."

A. L. Smyth, honorary secretary of the Society, and B. S. H. Rarity, past president, are to be congratulated for the persistence and care that lie behind this index. A fascinating browse, and a must for the library with serious interests in the history of science, technology, and business.—**Arnold Thackray**

Continued on next page

A new £20 note issued by the Bank of England shows Michael Faraday at one of the annual Christmas lectures he inaugurated at the Royal Institution.

Faraday Issue of BHC

Number 11 of the *Bulletin for the History of Chemistry* (Winter 1991) is devoted to "Michael Faraday—Chemist and Popular Lecturer." Based on a symposium commemorating the bicentennial of Faraday's birth, the issue focuses on his often neglected contributions to chemistry and on his lecturing skills. Derek A. Davenport of Purdue was the symposium organizer and is the author of three of the papers. Others were written by Geoffrey Cantor, June Z. Fullmer and Melvyn C. Usselman, Harold Goldwhite, Frank A. J. L. James, William B. Jensen, James F. O'Brien, Herbert T. Pratt, Sydney Ross, John T. Stock, John Meurig Thomas, Marcy Hamby Towns, Ryan D. Tweney, and L. Pearce Williams. Included are a biographical checklist and a detailed time-line showing concurrent political and chemical events in parallel.

PUBLICATIONS—*continued*

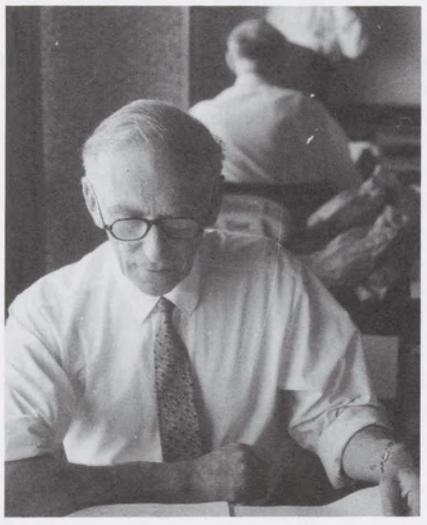
First Installment on Krebs

Frederic Lawrence Holmes. *Hans Krebs.* Volume 1: *The Formation of a Scientific Life, 1900–1933.* New York: Oxford University Press, 1991. 491 pages. $49.95.

This extraordinary book is the history of scientific ideas at its finest, detailing as it does almost every step and experiment in Krebs's investigations. Prominent is the path to the discovery of the urea cycle, one of Krebs's two pioneering achievements in intermediary metabolism, the other being his later discovery of the citric acid, or Krebs, cycle. Yet the account is set squarely in external history, the stormy history of Germany, from 1900 through World War I and the ill-fated Weimar Republic. The account also describes, of course, the medical and biochemical context, notably Krebs's apprenticeship under Otto Warburg. The volume ends with Hitler's rise to power and Krebs's departure for the laboratory of Frederick Gowland Hopkins in Cambridge, England. This book is superbly written, full of insights. One of the gems: "If scientists cannot avoid competition, historians cannot avoid hindsight" (p. 366).

Frederic Lawrence Holmes is Avalon Professor of History of Medicine at Yale University School of Medicine. He had access to all of Krebs's laboratory notebooks and interviewed Krebs extensively. He brought to this task the experience gained from his earlier studies of the biomedical researches of Antoine Lavoisier and Claude Bernard.

The next volume in this multivolume biography carries the subtitle *Architect of Intermediary Metabolism, 1933–1937.*



A Chemist Configured

At the Centennial of the 1892 Geneva Conference, celebrated in April 1992 (see Chemical Heritage *10:1, Winter 1992/93, p. 22), Vladimir Prelog presented a slide of R. S. Cahn, creator with Prelog and Christopher Ingold of the R and S system of designating molecular configuration. To the audience's delight, the slide showed Cahn seated in front of a mirror, to depict "both R. and S. Cahn."*

Books to Note

Carl Djerassi. *The Pill, Pygmy Chimps, and Degas' Horse: The Autobiography of Carl Djerassi.* New York: Basic Books, 1992. 319 pages. $25.00.

Carl Djerassi continues to surprise. We have taken note in these pages of his poems, of his full-length novel, *Cantor's Dilemma,* and of his autobiography in Jeffrey Seeman's ACS series Profiles, Pathways, and Dreams, entitled *Steroids Made It Possible.* Was there more to this chemist, industrial entrepreneur, poet, and novelist? Plenty. His new biography reveals how he became a vulnerable, sensitive, socially concerned human being, as he moved from his birthplace in Vienna via Bulgaria, the United States, Mexico, and research ventures in South America and Africa, to the artist's colony he created on his ranch in California. He expresses his response to the death of his daughter in a moving literary requiem.

Joseph S. Fruton. *A Skeptical Biochemist.* Cambridge, Mass.: Harvard University Press, 1992. 330 pp. $29.95.

Robert Boyle in 1661 wrote *The Sceptical Chymist* and Joseph Needham in 1929 *The Sceptical Biologist.* Now Joseph Fruton of Yale occupies the ground in between. He explores the ways some scientists, philosophers, historians, and sociologists have tried to come to terms with the problems encountered in biochemical research. He examines several meanings of "scientific method," the interplay of biology and chemistry, and the ways to write the history of biochemistry; and in his final chapter he looks at the changing meanings of central biochemical terms such as *protein* and *enzyme* and asks the reader "Is the Scientific Paper a Fraud?"

Ernst Homburg. *Van Beroep* Chemiker: *De Opkomst van de industriële chemicus en het polytechnische onderwijs in Duitsland (1790–1850).* (*Chemiker* by occupation: The rise of the industrial chemist and polytechnic education in Germany, 1790–1850.) Delft, Holland: Delft University Press, 1993. 583 pp.

Ernst Homburg examines the history of polytechnic chemical education in Germany, of the institutes of technology that slowly led to the definition of an industrial chemist. He points to the differences between the German schools and the Ecole Polytechnique, established earlier in France, and he supplies important information for comprehending the meteoric rise of German chemical industry. It is a book that needs to be made available in English.

Tracing the Path: African-American Contributions to Chemistry in the Life Sciences. Washington, D.C.: Department of Academic Programs, American Chemical Society, 1992. $10.00.

This eighteen-minute videotape moves from plant cures and evidence of steel making discovered in ancient Africa to the pivotal contributions of three African-Americans of our century: Ernest Everett Just's marine biological research at Woods Hole, Percy Julian's synthesis of steroids from soybeans and yams, and Charles Drew's development of ways to preserve blood plasma. The video was designed to interest young blacks in scientific careers, and it comes with a teacher's guide for discussion and experimentation in the classroom.

Other Recent Publications

Biography and Autobiography

D. M. Bodily; T. Davidson; M. Jaffe; R. B. Prime; J. G. Czorny; U. Gaur; S. F. Lau. "Bernhard Wunderlich: An Innovative Educator and Pioneer in the Physical Chemistry of Polymers." *Polymer Engineering and Science* 32 (1992), 1178–1187.

John Borchardt. "High Seas Chemist." *Chemistry & Industry* (1992), 449. On Sir Kenelm Digby.

Mark R. Finlay. "The Rehabilitation of an Agricultural Chemist: Justus von Liebig and the Seventh Edition." *Ambix* 38 (1991), 155–167.

Henry Harris. "Fritz Haber." *German History* 10 (1992), 24–38.

Edelstein Center Workshop: Organic Chemistry and High Technology, 1850–1950

The March 1992 issue of the *British Journal for the History of Science*, with Anthony S. Travis, Willem J. Hornix, and Robert Bud as guest editors, presents papers from a 1990 workshop hosted by the Sidney M. Edelstein Center for the History and Philosophy of Science, Technology, and Medicine, at the Hebrew University, Jerusalem. The foreword by the pioneer historian of the dye industry, John J. Beer, notes that almost every paper documents the reciprocal relations between academic and industrial activity. Two papers examine natural dye strategies in the face of synthetic competition—Johan Schot on Dutch madder and Peter Reed on British indigo. The volume also contains Henk van den Belton on the failure of the La Fuchsine monopoly; Ernst Homburg on emerging research laboratories in the dye industry; and Peter J. T. Morris on Walter Reppe and cyclooctatetraene. The editors have contributed articles on A. W. Hofmann and aniline red (Travis); biotechnology's roots in fermentation processes (Bud); and technological innovation in early dye manufacture (Hornix).

Alan Hodgkin. *Chance and Design: Reminiscences of Science in Peace and War*. New York: Cambridge University Press, 1992. The author received the 1963 Nobel Prize in physiology or medicine for electrochemistry of nerve conduction.

Charles D. Hurd. "Personal Recollections of Frank C. Whitmore." *Journal of Chemical Education* 69 (1992), 439–440.

Frank A. J. L. James. "The Tales of Benjamin Abbott: A Source for the Early Life of Michael Faraday." *British Journal for the History of Science* 25 (1992), 229–240.

Sushil Kumar, ed. *Bhatnagar Laureates (1958–91)*. New Delhi: Human Resource and Development Group, Council of Scientific and Industrial Research, 1992. Contains 43 biographies of Indian chemical scientists. For a review see *Science* 258 (13 Nov. 1992), 1170.

Brian Mason. *Victor Moritz Goldschmidt: Father of Modern Geochemistry*. San Antonio, Texas: Geochemical Society, 1992.

Peter J. T. Morris. "Reppe's Rings with Cagey Properties." *Chemistry & Industry* (1992), 533.

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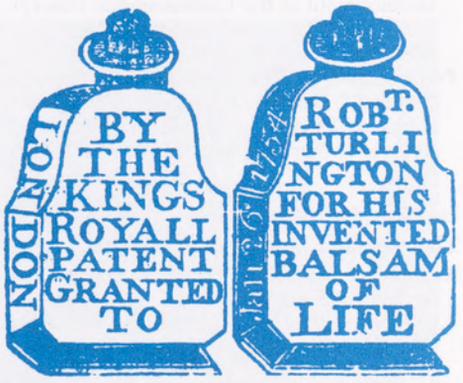

Bottles for Turlington's Balsam of Life, designed to discourage counterfeiting. From a brochure dated 1755–57 now preserved in the Pennsylvania Historical Society. Balsam of Life is still marketed today, as USP Compound Tincture of Benzoin. From Griffenhagen and Young, Old English Patent Medicines in America.

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PUBLIC OUTREACH

Woodward in Washington

What factors and fortunes prevent the scientific community from ignoring the junior member of a team? So mused Roald Hoffmann, reflecting on his collaboration with R. B. Woodward in the 1960s, when they developed the Woodward-Hoffmann rules. Those rules predict the feasibility and the stereochemical outcome of ring closure and ring opening in many systems not understood until then. Woodward was an internationally acclaimed Harvard chemist, Hoffmann a Harvard Fellow in his twenties. In 1981 Hoffmann, for his part in this work, shared the Nobel Prize with Kenichi Fukui, who had developed similar insights independently.

Hoffmann spoke at a Woodward symposium at the 1992 Washington ACS meeting, jointly sponsored by the Chemical Heritage Foundation and the ACS History of Chemistry Division. Ernest Eliel, 1992 ACS president, recounted reminiscences of RBW, who, it seems, drove Eliel, Geoffrey and Lise Wilkinson, and Ephraim Katchalski for eight hours in a rented stick-shift Peugeot from France to Switzerland to escape the chaos of an airline strike in 1968. Although no longer used to a stick shift, RBW would not entrust his life to another driver.

Arnold Thackray opened the program with "Organic Connections from Perkin to Woodward," the paper first given at the CHF Woodward Symposium in April. A wine and cheese reception followed, and participants—over two hundred—were invited to view the CHF traveling exhibit "Robert Burns Woodward and the Art of Organic Synthesis" in the Exhibition Hall.

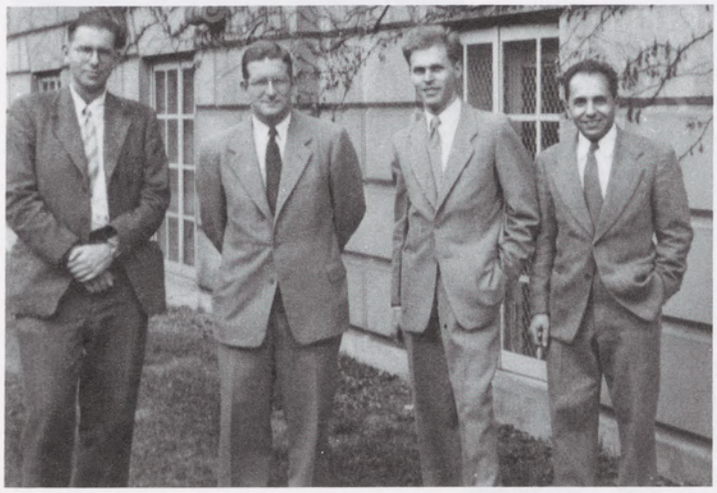
The Woodward exhibit at Pfizer's Central Research Division, Groton, Connecticut, was welcomed by senior vice president George M. Milne, Jr., left, and four former Woodward associates: Charles E. Moppett, Ernest S. Hamanaka, Robert L. Rosati, and Anton Fliri. CHF director Arnold Thackray is at the right. Courtesy Pfizer, Inc.

Woodward Visits Industries

Early stops on the route of the R. B. Woodward traveling exhibit created by CHF last year included the research centers of Pfizer Inc., Merck & Co., and E. I. du Pont de Nemours. All had Woodward connections: at Pfizer, four of his former associates greeted the exhibit; Merck's former research directors Max Tishler and Lewis Sarett were his lifelong friends; and Du Pont Merck Pharmaceutical Company's Mark A. Wuonola was a Woodward Ph.D.

Our Far-Flung Correspondents

Two items came in response to our Summer 1992 issue (9:2). Our picture of Cornell's Baker Laboratory reminded **W. P. Bebbington** of Evans, Georgia (whose book on Du Pont's Savannah River Plant we discussed on page O-6 of that issue), of the lectures by Sir William Bragg that he attended at Cornell. He adds: "Whatever ability I have as a writer I credit to Fred H. 'Dusty' Rhodes, Director of the School of Chemical Engineering."And **Hans Schindler** of New York thanked us for our explanation of the accent on the final *e* of Kekulé's name (p. O-2). "Living under French rule," he writes, "it is quite understandable that the family wanted to avoid having their name pronounced 'que cul.' "

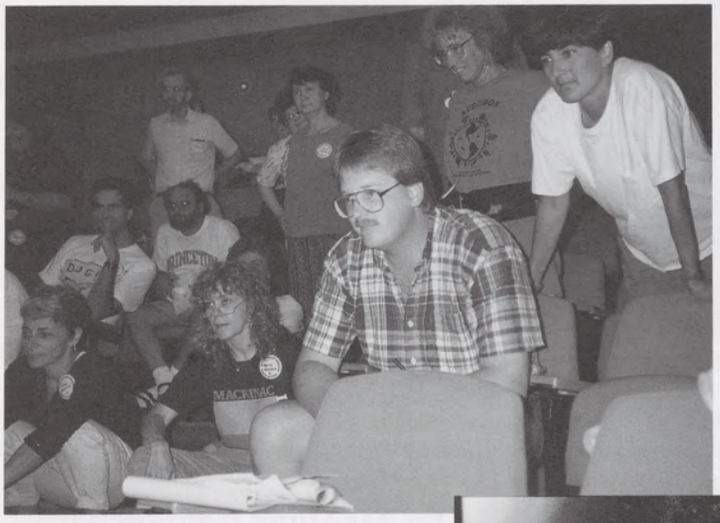


David Taub (Merck & Co., Inc., left) with RBW, Karl Heusler, and Franz Sondheimer around 1950, when they were working on the total synthesis of steroids. Taub wrote the "Citation Classic" on the synthesis for Current Contents *(6 April 1992). Courtesy David Taub.*

Woodward, Lise Wilkinson, Ephraim Katchalski, and Geoffrey Wilkinson with the rented Peugeot. From Ernest L. Eliel, From Cologne to Chapel Hill. *Washington D.C.: American Chemical Society, 1990. (Profiles, Pathways, & Dreams, ed. J. I. Seeman.) Courtesy ACS.*

Summer Institute Revisited: Teachers of Chemistry Revel in History

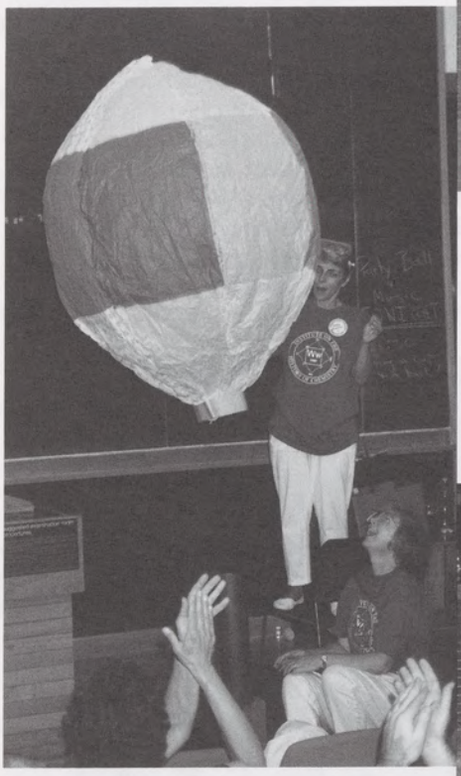
The message of the 1992 summer institute on chemical history—designed by the Chemical Heritage Foundation and the Woodrow Wilson National Fellowship Foundation and held at Princeton University—is spreading. This summer Andy Viruleg and three other 1992 participants are presenting one-week workshops on how to incorporate history into chemistry teaching, to groups of thirty teachers at Grand Valley University, Michigan; St. Mary's College, Leavenworth, Kansas; The University of California, Santa Cruz; and the University of Louisville, Kentucky. A similar week-long workshop is being conducted by Kathleen Thompson and Jim Ealy at Notre Dame College in Baltimore. Also this summer Nancy LeMaster will present "Chemistry through the Ages" as a workshop at the National Science Teachers Association meeting and at the Chemical Education Conference (Chem Ed '93) in August.



Institute participants shared successful teaching strategems, and some of the presentations brought viewers out of their seats. These rapt teachers from Arkansas, California, Mississippi, Missouri, New York, and Virginia are shown with CHF's Larry Friedman (left rear) and the Woodrow Wilson Foundation's Nancy Arnold (standing, right rear).

It was hot in Princeton. The pool in front of the Woodrow Wilson Building was fortunately close to the chemistry institute. Courtesy Nancy LeMaster. All other photos courtesy Alice Veyvoda.

On a trip to Philadelphia John Oliver shared a bench with Benjamin Franklin, although he was not able to gain his attention.



One task of the 1992 Princeton summer institute was to transcribe—then reenact—Michael Faraday's handwritten Christmas lectures. Here Enza McCauley of Lynchburg, Virginia, helps recreate Faraday's second lecture on properties of gases.

Roger Rumppe of Fort Atkinson, Wisconsin, and Nancy LeMaster of Pendleton, South Carolina, confer with visiting lecturer and Nobel laureate Roald Hoffmann.

Daniel Fox at GE

Daniel W. Fox was the creator of Lexan and "founding father" of General Electric's engineered materials ventures, now known as Worldwide Technology (see our Summer 1992 issue, 9:2, p. O-1). His papers have become part of CHF's archives. Charles C. Price, who chairs CHF's board, visited Worldwide Technology (WT) in Pittsfield, Massachusetts, accompanied by CHF's exhibit "Polymers and People"—including a special panel on Fox. Price presented WT's general manager, GE vice president Jean M. Heuschen, with a bound copy of CHF's finding aid for Fox's papers and a summary of his life and work, and explored future ways for CHF and GE to cooperate.

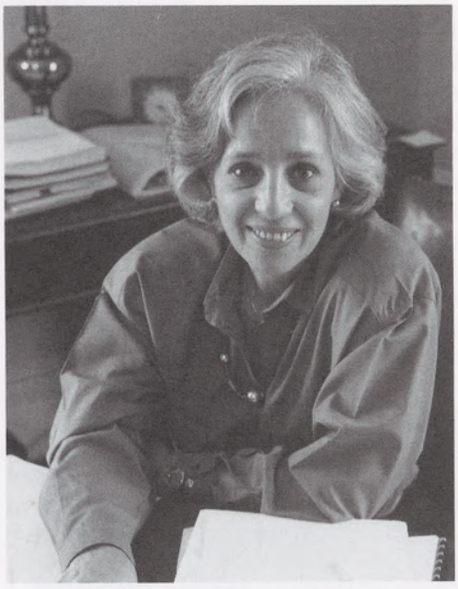
Jean M. Heuschen of GE's Worldwide Technology Center accepts the CHF finding aid for the Daniel W. Fox papers from CHF's Charles C. Price. The special panel depicting Fox's life and work is visible at right.

Maxine Singer Is Ullyot Lecturer

"Genes, Genomes, and Disease" was the title of the 1992 Ullyot Public Affairs Lecture, given 17 September by Maxine F. Singer, president of the Carnegie Institution of Washington. She surveyed the development of our knowledge of genetics, including the discovery of DNA, and noted its relevance to patent lawyers, philosophers, and ethicists—and indeed to every one of us. She then shared her own research on a "jumping gene" of importance in understanding cancer.

After graduating from Swarthmore College and acquiring a Ph.D. in biochemistry from Yale, Maxine Singer spent most of her career at the National Institutes of Health, where her last appointment was as Chief of the Laboratory of Biochemistry in the National Cancer Institute. She became president of the Carnegie in 1988, while retaining her laboratory at NIH. She was awarded the National Medal of Science for her research achievements and "her deep concern for the social responsibilities of the scientist."

The Glenn E. Ullyot Lecture Series, sponsored by the American Chemical Society's Philadelphia Section, the Chemical Heritage Foundation, the Department of Chemistry of the University of Pennsylvania, and the Philadelphia College of Pharmacy and Science, was established by Glenn E. Ullyot, who was associated with SmithKline Laboratories for over thirty years in research and management. The lectures arose from Ullyot's concern that the media's efforts to bring technological issues to the general public, though praiseworthy, have often distorted the public's perception of science and technology by focusing on problem areas. Positive developments tend to be less dramatic, and thus to bring them to the public's attention is a far more difficult task.



Maxine Singer, president of the Carnegie Institution of Washington, and the 1992 Ullyot lecturer.

CHEMICAL HERITAGE FOUNDATION

CHF Exhibits On the Road

Our traveling exhibits are becoming widely known, and reservations need to be made early. The only cost is that of return shipping. Write to Exhibits at the Chemical Heritage Foundation.

Exhibit itineraries for 1993 are as follows:

Polymers and People
June–July: Savannah Science Museum, Savannah, GA
22–27 August: ACS National Meeting Cell Symposium, Chicago, IL
15 September–15 October: Emory and Henry College, Emory, VA

Structures of Life
27 May–14 June: Hofstra University, Hempstead, NY
15 September–31 October: University of Tennessee, Martin, TN
18–20 November: AICHE Meeting, St. Louis, MO

Robert Burns Woodward and the Art of Organic Synthesis
27 May–5 June: Bishops University, Lennoxville, Quebec, Canada
13–17 June: ACS National Organic Symposium, Bozeman, MT
October: Kalamazoo Local ACS Section, Kalamazoo, MI
November: Beckman Institute, Pasadena, CA
15 January–1 March 1994: The Berman Museum of Art, Collegeville, PA

VISITORS & EVENTS

Conversazioni

Glenn Seaborg and Nobel

Glenn T. Seaborg, Nobel laureate, creator of elements, and a governor for many years of the American Swedish Historical Museum in Philadelphia, spoke in CHF's Conversazione series this fall when the museum brought him here as guest of honor at its Alfred Nobel Weekend.

Speaking at CHF before an audience that included a class from Lehigh University, Seaborg described the steps that led to his extension of the periodic table beyond uranium, and his many years of service as chairman of the U.S. Atomic Energy Commission. The talk culminated in his personal reminiscences of ten U.S. presidents, beginning with Franklin D. Roosevelt. Seaborg's *National Service with Ten Presidents of the United States* (Lawrence Berkeley Laboratory, U.S. Department of Energy, PUB-704) was published last year, with numerous photographs.

At a gala dinner hosted by the American Swedish Historical Museum, Seaborg was named governor emeritus and officially opened two exhibits brought here by the Nobel Museum of Sweden and the Nobel Foundation: "Alfred Nobel, the Man and His Science," and "The Nobel Prize."

Glenn Seaborg at the CHF with admiring students from Lehigh University.

Come visit the Nobel exhibit—now on display in the CHF lobby, through this summer.

Ralph Hirschmann of Merck and Penn

Ralph Hirschmann, who recently was honored by a major symposium at Penn (see *Chemical Heritage* 10:1, Winter 1992–93, p. 8), spoke at a CHF luncheon Conversazione of the neglect of history in science teaching and the student's consequent lack of appreciation of the process of discovery—of the failures and pitfalls, and the dogged perseverance required. He mentioned Homer Adkins of Wisconsin as one of the few professors who included his philosophy of science in his lectures. Among his insights: "Logic is one of the few ways of going wrong with confidence."

Hirschmann was originally interested in an academic career, but Max Tishler recruited him for Merck. There he rose from research chemist to senior vice president. He told of his long involvement in the commercialization of the 37-step synthesis of cortisone, made possible by the dedicated cooperation of hundreds of Merck employees. This cooperative aspect of American industry, known as a competitive enterprise, is seldom mentioned.

Hirschmann emphasized that universities and industry are totally dependent on each other. He discovered on moving to Penn that professors too have to be entrepreneurs, and that the most rewarding factor in his university teaching was interaction with graduate students and postdoctoral fellows. He is currently collaborating with Penn's Amos B. Smith III in research in bioorganic chemistry.

Nobel's dynamite was used to blast away Hellgate Rocks at the mouth of the Hudson River in order to open New York harbor for shipping. Courtesy the Nobel Museum.

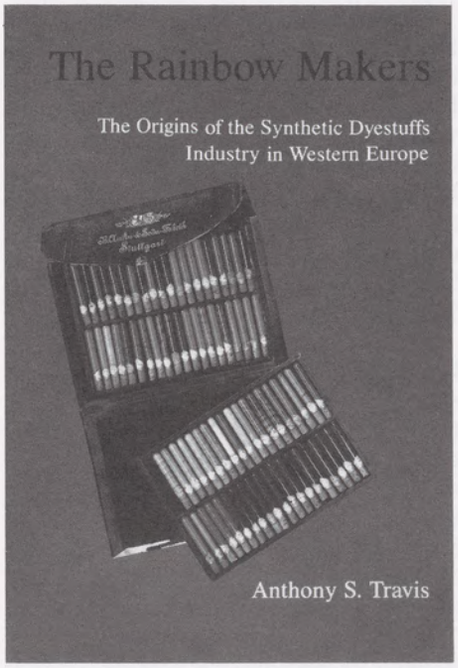
L. John Polite, Jr., on Big and Little Companies

While most company executives and entrepreneurs dream of making their ventures ever bigger and thereby—they hope—better, L. John Polite, Jr., president of The Chemists' Club, has perceived the charms, virtues, and promise of small companies, often those cast off after mergers and giant acquisitions. Working at first with Diamond Alkali, where he was at various times responsible for carbon tetrachloride, Agent Orange, and DDT production, he one day decided he would prefer to develop a smaller company on his own. He headed Essex Chemical Company for

many years, until it became so large that he sold it to Dow. He then became head of the small Peridot Company, a position he still holds. He pointed to the loyalty of employees and clients in smaller firms and the advantages of decentralization, and he recounted the lessons he had learned about the acquisition and nurturing of small companies. Not all that the giants spin off is worth taking on.

In an earlier term as president of The Chemists' Club, Jack Polite was influential in the transfer of the historical sections of the club's book and journal collection to form the core of the fast-growing Othmer Library.

Conversazione speakers. Above: Chemist's Club president L. John Polite, Jr. (right), examines books the club donated to the Othmer Library in 1989, as CHF's Charles C. Price and Arnold Thackray look on. Far right: Ralph Hirschmann of Merck and Penn.



Focus: Dyes

On 23 March the Chemical Heritage Foundation held a special Conversazione and reception for Anthony S. Travis, whose *The Rainbow Makers: The Origins of the Synthetic Dyestuffs Industry in Western Europe* had been published two days earlier by Lehigh University Press. The book promises to become a classic, the definitive work in its field. Tony Travis spent twenty-five years in textile and printing industries, has taught in high schools and colleges, and actively contributes to the incorporation of historical materials and activities in emerging science curricula and laboratory programs. He is now Deputy Director of the Sidney M. Edelstein Center for the History and Philosophy of Science, Technology, and Medicine at Hebrew University in Jerusalem, a center closely associated with CHF. Hebrew University also houses the world's preeminent collection on the history of bleaching, dyeing, finishing, and spot removing, assembled over decades by Sidney Edelstein.

For history buffs the early and mid 1990s are fast becoming the years of the dyestuffs industry. The *American Dyestuff Reporter* celebrated its seventy-fifth anniversary in November 1992 with a lavish issue that featured a forty-two-page illustrated history of the international dyestuffs industry by Peter J. T. Morris of the Science Museum, London, and Tony Travis. Also featured was Sidney Edelstein's classic biography of Sir William Henry Perkin, reprinted after thirty-six years. Eight other historical articles rounded out the issue, and colorful advertising displays from companies told of their heritage and provided important time-lines.

In the not too distant future—in 1996—The American Association of Textile Chemists and Colorists will celebrate its own seventy-fifth anniversary, and its officers are busily planning suitable celebrations.

Irene Lukoff Visits the Edelstein Center

Irene I. Lukoff (left), CHF's assistant director for administration, was in Jerusalem last fall on the day that Tony Travis (right), deputy director of the Sidney M. Edelstein Center for the History and Philosophy of Science, Technology, and Medicine, was appointed Senior Researcher in the History of Technology at Hebrew University. The National and University Library adjoins the center and houses the Sidney Edelstein Collection (plaque), which documents the historical sources of the dye industry.

Visitors

Asbestos: Mineral Monster or Miracle

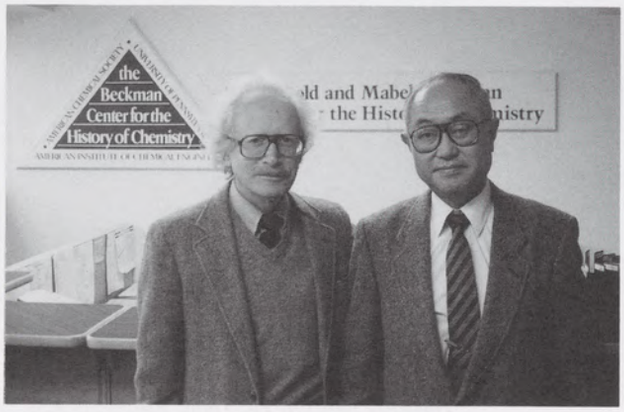
James E. Alleman of Purdue University's School of Civil Engineering visited the Othmer Library recently to search through our archival holdings for texts and reports associated with asbestos use. Alleman is compiling a retrospective history of asbestos, covering over two millennia. Starting with ancient lamp wicks and fireproof linens, his studies have documented this remarkable mineral's metamorphosis into a strategically critical commodity. Although now tarnished by its lethal nature, asbestos still serves numerous roles, from high-tech applications in space shuttle rockets and submarines to lowly nuts-and-bolts gaskets. If you have memories regarding your own experience with asbestos, James Alleman would be pleased to hear from you!

Other Visitors

■ **Hendrik H. Deelstra** of the University of Antwerp, Belgium, who will soon take over as chair of the Working Party on History of Chemistry of the Federation of European Chemical Societies, visited us to establish personal contact with the Chemical Heritage Foundation. He succeeds Jan van Spronsen of Utrecht, the Netherlands.

■ Last fall CHF was host to three Du Pont executives: **Alexander MacLachlan,** senior vice president of R&D and CHF board member; **John W. Collette,** director of scientific affairs; and **Howard E. Simmons, Jr.,** head of the newly constituted Du Pont–Merck. They are seen here with CHF's director Arnold Thackray at the left.

The Japanese Society for the History of Chemistry



Tetsuo Shiba of Osaka University brought news on history of chemistry activities in Japan. Here he is seen with editor Theodor Benfey. Courtesy Tetsuo Shiba.

The Japanese Society for the History of Chemistry aims to promote research in the history of chemistry and chemical technology and to encourage interest in this field among chemists, chemistry teachers, historians, and the public. The late Dr. Bun-ichi Tamamushi, an eminent colloid chemist and the first president of the society, was instrumental in its foundation in 1973 and its subsequent development. Originally a division of the History of Science Society of Japan, the society soon became an independent body and expanded its scholarly and social activities. Our membership is now over 450, consisting of historians, chemists, chemical engineers, and high school chemistry teachers.

Kagakushi Kenkyu (Studies of the History of Chemistry), the official organ of the society, was first published in 1974, and fifty-eight issues have appeared thus far. The journal carries the same phonetic title as the journal of the History of Science Society of Japan, because the Japanese words for science and chemistry are phonetically the same although the written characters are different. To avoid confusion, we usually use an abridged alphabet title, *Kagakushi,* to designate our journal. Its current editor is Chikayoshi Kamatani, professor at Tokyo University. Now published quarterly, the journal carries articles, notes, sources, book reviews, notices of recent publications, and news items. Articles and notes carry English summaries. The journal also runs series of essays by invited contributors, including the current "More Light on Lavoisier: The Research of the Last Twenty Years." We are planning a series called "New Trends in the History of Science."

Our society's foremost activity is the two-day annual meeting in the fall, during which a special symposium is held. Past symposia have covered such diverse topics as "Japanese Chemistry and Chinese Chemistry" (1985); "Chemical History and Chemical Education" (1987); "The Atomic and Molecular Theory and Modern Chemistry" (1988); and "The Tradition of Chemistry in Japan: The Role of the University" (1991).

The Spring School for History of Chemistry provides a forum in which society members can discuss recent trends in the history of chemistry, focusing on historiography and exchanging up-to-date information on international scholarship in the field. The Spring School has drawn growing attention from younger generations of chemical historians. Recent topics have been "The Atomic Theory and Chemistry" (1985); "Reviews of C. A. Russell's *Recent Developments in the History of Chemistry*" (1986); "Recent Studies in the History of British Science" (1988); "The Social Dimension of Chemistry" (1989); and "Recent Studies in the History of Chemical Sciences" (1991).

The Summer Salon for History of Chemistry, held in August, is an informal gathering designed to allow intellectual conversations and exchange of information on specific subjects. Retired chemists who have played significant roles in their fields are sometimes invited to share their recollections. Recent topics have included "Michael Polanyi as a Chemist," "Chemical Technology in the Edo and Meiji Eras," and "Modernization of the Chemical Industry in Japan" (1986); "From Coal Chemistry to Petrochemistry" (1988); "Chemical Engineering in Japan in the 1940s" (1990);

and "World War II and Synthetic Petroleum" (1991).

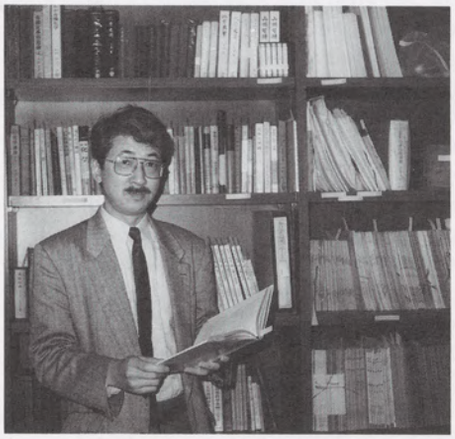
Since 1990 we have sponsored joint symposia with the Chemical Society of Japan at its national meeting, to foster a historical interest among chemists. Past symposia have focused on such topics as "The Nobel Prize and Chemistry" and "The Emergence of the Modern Chemical Industry in Japan" (1990). A symposium on "History of Petroleum Development" is scheduled for the Chemical Society's meeting at Niigata in October 1992. Our society has also arranged a series of exhibits of old chemical books and manuscripts at the Chemical Society headquarters in Tokyo.

As the society has grown, it has become increasingly apparent that tension exists between professional historians, chemist-historians, and chemistry teachers concerning the use of history for chemical education. To help bridge this gap and promote sound communications, the society has initiated a special forum for chemical-history education to be held each spring.

The society also publishes important historical sources. To commemorate its tenth anniversary, the society published three volumes of *A Source Book on the Atomic and Molecular Theory*, consisting of commentaries and Japanese translations of important papers on the subject published in Europe from the seventeenth to the nineteenth century. Collecting historical materials in Japan is also our deep concern. To commemorate the society's twentieth anniversary, we have launched a project to reprint versions of over forty Japanese books on the chemical sciences written during the Edo and early Meiji periods. Since these texts are now rare and difficult to obtain, this project will serve future scholarly research on the early history of chemistry in Japan. A search to locate copies is now under way.

Although our society has different aims and programs from those of the Chemical Heritage Foundation, we want to learn from it and to keep in close contact for mutual development. In past decades the history of Japanese chemistry and chemical technology has increasingly drawn interest and attention from overseas. We consider it one of our major tasks to preserve historical materials, to supply appropriate information, and to encourage further research in this field. Members of our society are interested in sharing the fruits of their work with foreign scholars. We welcome membership from foreign countries. For new membership subscriptions to *Kagakushi* and inquiries, please address Professor Tatsuaki Yamaguchi, Chiba Institute of Technology, Narashino, Chiba 275, Japan. (Orders may also be sent to the Export Department, Maruzen Co. Ltd., P.O. Box 5050, Tokyo International 100-31, Japan; Telex J-26517.)

TETSUO SHIBA
President of the Japanese Society for the History of Chemistry

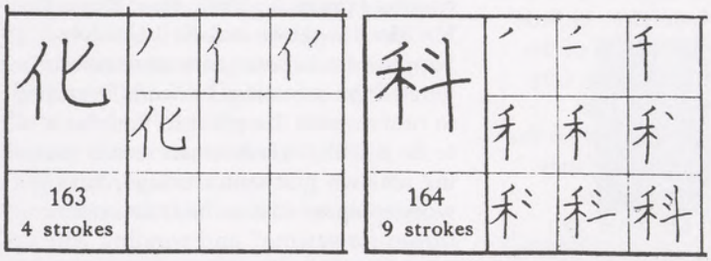


Japanese interest in history of chemistry is steadily increasing. Recently donated to Tokyo Denki University was the collection of five hundred books made by Nozamu Yamaoka (1892–1978), here pictured behind the university's Yasu Furukawa, currently a visiting scholar at the Beckman Center.

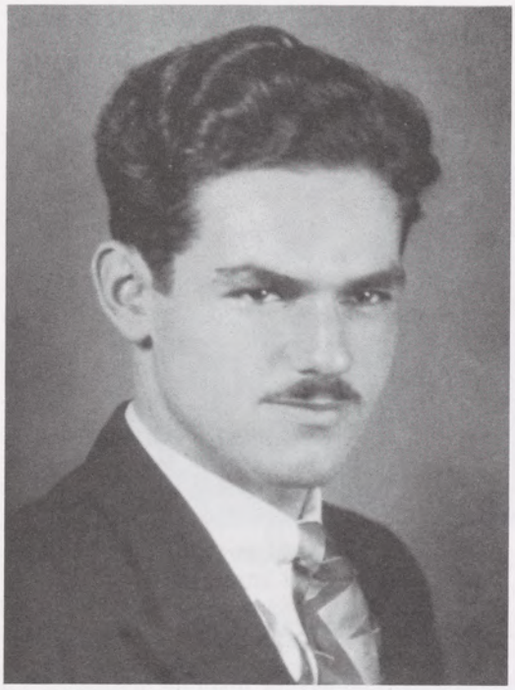
Rensselaer's Winslow Chemical Laboratory is saved from the bulldozers.

Troy Preserves Rensselaer Chemical Laboratory

The Winslow Chemical Laboratory of Rensselaer Polytechnic Institute of Troy, New York, built 1865 to 1866, will not be demolished, thanks to the City of Troy's decision to lease it from the university for restoration. The laboratory was named to honor Rensselaer's fifth president, John F. Winslow, who emphasized the need for a chemical laboratory and contributed $5,000, about half the construction cost, to build it. He owned the Rensselaer Iron Works of Troy, one of two companies that produced the plating for the Civil War ironclad *Monitor*.



Two characters for the phoneme ka. *That on the left (163) is used in* kagaku *(chemistry); that on the right (164), in* kagaku *(science).*



"A chemist is always surrounded by a certain indefinable something that always denotes his work. We don't mean odoriferous scents, of course. Norman has worked on such problems as the valence of mercury in mercurochrome, and others too numerous for these pages." From the 1932 Hullabaloo. *Courtesy the Ferdinand Hamburger, Jr., Archives of the Johns Hopkins University.*

Hackerman—*continued from page 1*

traditional coed school on the other side of town and the Baltimore Polytechnic Institute, which was engineering oriented.

Using the term *college* for a high school was "not improper." Hackerman took courses in math through calculus, and two full years of chemistry, including organic. Noting the intensity of the educational demands at Baltimore City College, Hackerman contends that "they were much more difficult than the current colleges in terms of what they asked you to do and what they expected of you in return for what you heard." Successful students were able to place directly into state medical schools without "any intermediate college training," but Hackerman became so enthralled with his chemistry laboratory experience that he decided to remain in chemistry. This decision was questioned by family and friends, who wondered if he was going to be a pharmacist, which they considered to be at best an "honorable position."

Finding Electrochemistry

Hackerman, constrained by limited resources to live at home while attending college, in 1928 entered a six-year Ph.D. program at Johns Hopkins University that gave no intermediate degrees. Unable to obtain financial aid for the first three years because of the university's unstable financial condition, he sold women's shoes "to take care of operating expenses," while his parents worked very hard to cover the $900 yearly tuition. Several years after the Depression began in 1929, the university was unable to pay its bills. The faculty was not being paid either, and several outstanding members were forced to leave, including Harold C. Urey, Paul Emmett, Maurice Huggins, and Neil Gordon. Supplies for experiments were not ordered from a catalog. Instead, "you had to root around the place to find the stuff to do it with." Hackerman recalls making his own mechanical relays, "using a wooden spool that came from cotton thread for sewing" and winding wire on it from an old rheostat.

"When it became apparent in the midst of the Depression that people without the B.A. degree were going to be hard to sell to employers," Hackerman took an additional year and in 1932 gave the university ten dollars for the undergraduate diploma. To select a Ph.D. dissertation problem, Hopkins students spent several months working in four different laboratories of their choice. With E. Emmett Reid, the eminent organosulfur chemist, Hackerman prepared a number of thioethers. He smelled so bad that he "could get on a streetcar and get a seat with no trouble." A malfunctioning Grignard reaction gave him a strong dose of formaldehyde that selectively damaged his odor sensors. Although he cannot smell skunks, small amounts of certain perfumes are highly accentuated. The accident also caused Hackerman to decide "against being an organic chemist."

Hackerman found that the X-ray lab "wasn't bad." But in order to center the camera on the X-ray tube, he had to reach around the lead shield and "fiddle with it to get it lined up." When two fingers began to show burns from the X-rays, Hackerman decided he "wasn't going to do that one either."

"The catalysis lab was all right, but it was really very rote." Joseph Frazer had been instrumental in producing Hopcalite, a mixture of metal oxides used as a catalyst in coal mines to oxidize carbon monoxide to carbon dioxide. To Hackerman, the work in Frazer's lab seemed quite routine: mixing, precipitating, drying, doing a standard catalytic oxidation, and then starting all over again. In 1934, the year before Hackerman received his degree, none of the Ph.D. graduates obtained a job. About twenty of them spent the year on a WPA project at Hopkins, making Hopcalite in as many different ways as they could. They were lined up in a large laboratory, stirring solutions in three-foot-high ungraduated glass cylinders to form different-colored precipitates.

Crossing catalysis off his list, Hackerman proceeded to the lab of W. A. Patrick, who had the silica gel patents that were "handed off" to the Davidson Chemical Company, the principal purveyors of silica gel for many years. Here Hackerman became interested in measuring the zeta potential of silica gel, for which he devised a scheme for setting the gel around a silver–silver chloride electrode. He had "pretty much completed" that when Patrick asked him to try to determine the molecular composition of sulfur monochloride dissolved in various solvents. Patrick thought he had a way of refining gasoline using sulfur monochloride, but Hackerman admits that "if he knew before what he knew after," he never would have tackled the problem. Nevertheless, he completed the work as his Ph.D. dissertation, even though he never followed up on any of its aspects.

JAMES J. BOHNING

Hackerman's story will conclude in our next issue, with a description of his academic and consulting work during the Depression and his final landing of a government job.

MEETINGS

ASBMB National Meeting, San Diego, California, 30 May–3 June 1993.

ASMS Annual Meeting, Las Vegas, Nevada, 6–11 June 1993.

AACC Annual Meeting, New York, New York, 11–15 July 1993.

The program will include a symposium, "Where Did They Come From? The History of the Development of Instrumentation in Clinical Chemistry," moderated by Seymour Winsten.

AIChE 1993 Summer National Meeting, Seattle, Washington, 15–18 August 1993.

206th ACS National Meeting, Chicago, Illinois, 22–27 August 1993.

HIST Program Chair: M. D. Saltzman, Department of Chemistry, Providence College, Providence, Rhode Island, 02918-0001; (401) 865-2298. The HIST program includes a symposium, "C. K. Ingold, 1893–1970: Master and Mandarin of Physical Organic Chemistry," organized by Derek A. Davenport, Department of Chemistry, Purdue University, West Lafayette, Indiana 47907; (317) 494-5465; and M. D. Saltzman.

XIXth International Congress of History of Science, Zaragoza, Spain, 22–29 August 1993.

AATCC International Conference and Exhibition, Montreal, Canada, 3–6 October 1993.

Electrochemical Society Fall Meeting, New Orleans, Louisiana, 10–15 October 1993.

Society for the History of Technology Annual Meeting, Washington, D.C., 14–17 October 1993.

V Convegno Nazionale di Storia e Fondamenti della Chimica, Perugia, Italy, 27–30 October 1993.

To receive a descriptive circular, contact Professor Gianlorenzo Marino, Dipartimento di Chimica, Via Elce di Sotto 8, 06123 Perugia, Italy.

Centenary of Christopher Ingold, University College, London, England, 28 October 1993.

A meeting sponsored by the Royal Society of Chemistry Historical Group and the University College chemistry department. Alwyn Davies, D. P. Craig, and others will speak on Ingold's work on aromatic character and physical-organic chemistry. For details contact Professor J. H. Ridd, Department of Chemistry, University College, London, Gower Street, London WC1E 6BT.

Society for Literature and Science Annual Meeting, Boston, Massachusetts, 18–21 November 1993.

The theme is "Possible Worlds, Alternate Realities: Literature and Science as World-Making." For information write to Alvin Kibel, Literature Department, MIT, Cambridge, Massachusetts 02139.

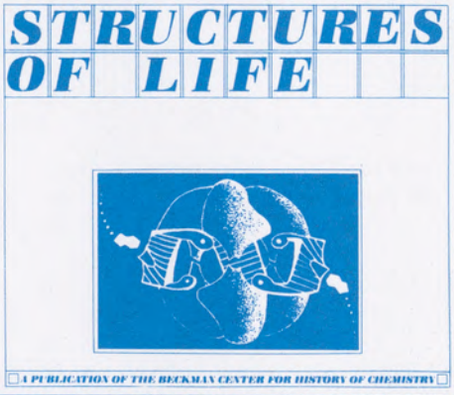
Bicentennial Commemoration of the Death of Antoine Lavoisier, Paris, France, 3–6 May 1994.

Included will be visits to Lavoisier's laboratory and to his former holdings in the Blois region. For details contact Madame Michèle Goupil, Bicentenaire Lavoisier, Académie des Sciences, 23 Quai Conti, 75006 Paris, France.

Electrochemical Society Spring Meeting, San Francisco, California, 22–27 May 1994.

AIChE Annual Meeting, St. Louis, Missouri, 7–12 November 1993.

A special history program on 10 November, "Chemical Engineering and BioTechnology, Then and Now," will include both morning and afternoon sessions. Elmer L. Gaden, Jr., of the University of Virginia will chair, with Stanley I. Proctor as vice-chair. The CHF booth and the traveling exhibit "Structures of Life" will be on display.



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Two Stamps Honor Chemists

Right: *the Percy Julian stamp.*

Percy Lavon Julian (1899-1975) was a distinguished scientist and chemical researcher.
His synthesis of cortisone for arthritis, a drug for glaucoma and synthesis of progesterone won acclaim.
In 1990, Dr. Julian was inducted into the prestigious National Inventors Hall of Fame.
Percy Lavon Julian
29
Black Heritage USA

Percy Julian Stamp. Bernhard Witkop of NIH, who was instrumental in nominating steroid chemist Percy Julian to become the first African-American in the National Academy of Sciences, has now achieved a second goal, a U.S. postage stamp in Julian's honor. As part of the Black Heritage series, he joins physician Charles Drew, social reformer Sojourner Truth, baseball's Jackie Robinson, Martin Luther King, Jr., and George Washington Carver. CHF now has a Julian archive donated by Witkop (see *Chemical Heritage* 10:1, Winter 1992/93, p. 11).

The van't Hoff stamp and its cancellation.

Van't Hoff Commemorative Stamp. A new first-day cover and special commemorative sheet of Jacobus Henricus van't Hoff was sent to us by Jan W. van Spronsen, author of *The Periodic System of Chemical Elements* (Amsterdam/New York, 1969) and chair of the European Working Party on History of Chemistry. Van't Hoff (1852–1911), who in 1901 won the first Nobel Prize in chemistry, is depicted sitting at a classic typewriter, while equilibrium arrows dance behind him—arrows whose meaning and significance he brilliantly elucidated. The cancellation depicts the molecular models van't Hoff constructed to elucidate famous proposal that the valences of the carbon atom are tetrahedral.

CONTENTS 10:2

1 Norman Hackerman and the Great Depression
1 AIC Joins CHF
2 125 Years of the CHF Logo
4 Beckman and Future R & D
4 BIMOSI: National Radiobiology Archives
5 Celebrity DNA
6 The German Chemical U-Boat
7 Eva Armstrong and E. F. Smith
9 Grants & Awards: Edelstein Fellows; Dexter Award
10 Friends of CHF
11 Realizing a Dream (Othmer Library)
12 Found in the Othmer Library IV: Pauling
12 Books Keep on Coming
13 Archives: CHF, Harvard
14 Publications
19 Public Outreach: Woodward Events; Summer Institute Revisited; Fox at GE; Ullyot Lecturer
22 Visitors & Events
24 Japanese Society for History of Chemistry
25 Troy Preserves Chemical Lab
27 Meetings
28 Stamps Honor Chemists

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